Examining the impact of financial circumstances and disciplinary field of study on seniors' participation in high-impact educational practices at research-intensive universities

A Dissertation
SUBMITTED TO THE FACULTY OF
UNIVERSITY OF MINNESOTA
BY

Laura S. Gorny

IN PARTIAL FULFILLMENT OF THE REQUIREMENTS
FOR THE DEGREE OF
DOCTOR OF PHILOSOPHY

Dr. Frances Lawrenz

August 2017

© Laura Gorny 2017

Acknowledgements

If it were not for TRIO programs, including Talent Search, Student Support Services, and the Ronald E. McNair Scholar's Program at University of Colorado at Boulder, I would not be here typing my final thoughts regarding my dissertation. If it weren't for the support of these programs, I not only would have dropped out of college in my sophomore year due to financial struggles and pending homelessness, I never would have dreamed of pursuing post-baccalaureate studies. I pursued a Master's in Higher Education Administration from Syracuse University and a Doctorate in Educational Psychology-Quantitative Methods in Education from the University of Minnesota due to the support and encouragement of TRIO programs. As a McNair Scholar, I was part of a community of scholars from all walks of life, with one common purpose; ensuring that voices from their communities were heard in academia. Through research, teaching, and service, scholars like myself strive to ensure that students from similar circumstances are encouraged and supported during their path towards a college degree, and hopefully, upward economic mobility.

Being a first-generation college student from a low-income background, I know, personally, how difficult attending college can be, especially graduate school. Many of my graduate school peers and professors were from highly educated families that did not appear to struggle financially. I did not always feel as if I belonged, but thanks to key people in my life, I persisted to this moment. The road to my doctorate has been long. On the way, I had two wonderful children, Tyler and Elle Marie, whom I thank for their patience as mommy was juggling the responsibilities of being a mother, scholar, teacher, administrator, and wife. Thank you, Steve Gorny, for supporting me, holding down the fort, and listening. A special thank you for my Mother, who traveled to Minnesota to watch the kids so that I could focus on important projects and take exams. Thank you to all of my family and friends for encouraging me to stick with my doctoral studies, even when the going got tough.

Speaking of encouragement, and patience, thank you, Dr. Frances Lawrenz, for sticking with me and supporting me throughout this process, as well as opening up opportunities for me to secure funding and develop as a scholar and a teacher. A special thanks goes out to staff and professors who helped me along the way, including my committee (Dr. Michael Harwell, Dr. Darwin Hendel, Dr. Bob delMas and Dr. Michelle Everson), as well as Valerie Embry, Ramona Beal, Vince Tinto, and Cathy Engstrom. I have learned a great deal from each of you. I also want to thank Dr. Peter Radcliffe for encouraging my development as an applied researcher and an analyst, and Dr. Ron Huesman, for supporting my graduate studies while at the same time encouraging my professional development in institutional research and, in particular, survey research. A heartfelt thank you goes out to the ones who care enough to dedicate their lives and passions towards helping others. You know who you are!

Dedication

This dissertation is dedicated to my father, who insisted that I go to college. I will always remember my first 'real' job at Kentucky Fried Chicken on the East Side of Binghamton, New York. If I ever complained, he would say, "If you want a good job, you need to go to college." He always wished that he had the opportunity to go to college. I thank him for ingraining the notion, as it was not always my intention.

I also dedicate this dissertation to all folks out there thinking about attending or already pursuing higher education, despite obstacles, or a feeling as if they don't belong. Stick with it! We need you here to help make a difference!

Abstract

This study is comprised of two phases: (1) examining construct validity evidence of self-reported financial circumstances (household income and social class student survey responses) and (2) modeling the influence of financially dependent seniors' financial circumstances on participation in high-impact practices (HIPs) after controlling for ethnicity, sex, parental education, and academic discipline. Phase one descriptive evidence suggested that while financially dependent students under-estimated parental household income, on average, parental income (as measured on the FAFSA) and SERU income item responses were positively related. Stepwise logistic regression was used to model the influence of financial circumstances and academic discipline on HIPs participation (after controlling for race/ethnicity, sex, and parental education). Financial circumstances did not have a significant main effect on HIPs participation. Main effects were observed for academic discipline, with students majoring in STEM fields having greater odds of participating in research with faculty relative to social science students. Relative to social science majors, communications, business, and engineering majors were more likely to participate in internships; and arts and humanities, communications, and engineering students were more likely to participate in senior theses. Education students were less likely to participate in senior thesis/capstone experiences than social science students.

Table of Contents

List of Tables

List of Figures

Chapter One: Introduction

In this section, I provide a brief overview of the literature, as it relates to student participation in high-impact practices (HIPs) experiences, while arguing that a close examination of equitable access to these educationally enriched experiences should be performed, especially since they are linked with essential learning outcomes that are deemed beneficial by employers. HIPs equity studies, or studies that explicitly used the American Association of Colleges & Universities LEAP-defined HIPs, have examined access by traditionally underserved students in terms of race/ethnicity, first-generation status and more. This section briefly argues that HIPs equity studies are needed to consider the experience of students from low-income backgrounds too. The topics will be expounded upon in the Chapter Two Literature Review. Chapter One includes an overview of (a) research gaps, (b) conceptual framework, (c) purpose of the study, (d) research questions, and (e) an outline of the structure of this dissertation. The structural outline is necessary, as the research was conducted in two phases, which you will read about later.

Students from lower-income backgrounds and lower socioeconomic statuses are increasingly enrolling in institutions of higher education (Cahalan et.al., 2016), and in research universities in particular (AAU, n.d.). The Pell Institute for the Study of Opportunity in Higher Education's most recent equity trend publication, *Indicators of Higher Education Equity in the United States* (Cahalan, et. al., 2016) found that while gaps across racial/ethnic groups have narrowed between1976-2014, distinct patterns of

inequity still exist. The Institute noted that the most marked inequities were observed when considering families' financial circumstances. While college enrollment of low-income students has increased over the last 20 years, equity gaps in college attendance rates between lower- and higher-income remain prominent. Relative to higher-income students, a smaller percentage of low-income students attend more selective, four-year public and private institutions. Not only has the gap widened over the past 10 years, college has become less affordable relative to family income since 1970, and less low-income students graduate from college than their higher-income peers (Cahalan, Perna, Yamashita, Ruiz, & Franklin, 2016).

AAU (n.d.) also noted an increase in enrollment of low-income students in large, research-intensive universities, which tend to be more selective in admissions. Given that it is a larger financial burden for low-income students to attend college and they graduate at lower rates than their higher-income peers, it is imperative that institutions of higher education leverage resources to ensure that students are participating in educational activities that increase their chances of being retained through graduation, and that they graduate with the skills they need to effectively compete in the workforce.

Employer surveys indicate that students are not graduating with skills that are perceived as valuable in the workplace (Hart, 2006; Hart, 2007; Hart, 2008; Hart, 2013; Hart, 2015).The AAC&U has, through its collaborative Liberal Arts Education and America's Promise (LEAP) initiative, begun creating tools to help higher education stakeholders

articulate student learning and development outcomes, as well as identifying educationally enriched activities and programmatic high-impact practices, to help ensure that students, especially those from traditionally underserved and underrepresented backgrounds (Kuh, 2008; Finley & McNair, 2013; Finley, 2011; Brownell & Swaner, 2009) are engaged with college and achieve LEAP-defined essential student learning outcomes.

Based on best practice literature, Kuh (2008) cited AAC&U's ten high-impact practices (HIPs) as programmatic efforts that are designed to actively engage students across their educational career, including first-year seminars and learning communities, which are typically offered early-on, and research with faculty, internships, and capstone courses, which are typically encountered near the end of the students' careers. Other HIPs that can occur at any time are common intellectual experiences, writing-intensive courses, collaborative assignments and projects, and service and community-based learning. As Kinzie (2012) highlighted, "When done well, these practices require students to make their own discoveries and connections, grapple with challenging real-world questions, and address complex problems—all necessary skills if students are to become engaged and effective members of their communities" (p. 1).

Scholars have worked at exploring the link between HIPs participation and desired outcomes (Kuh, 2008; Brownell & Swaner, 2009; Finley, 2011; Finley & McNair, 2013; Lopatto, 2010; Keller, 2012; NACE, 2010; Parker, Kilgo, Sheets & Pascarella, 2016;

Knouse, Tanner & Harris, 1999). Noting the beneficial outcomes associated with HIPs participation, they have set out to conduct HIPs equity studies by examining whether traditionally underserved students have equitable access and representation in HIPs (Finley & McNair, 2013; Lydell & Gorny, 2014; Lydell & Gorny, 2015b). Finley (2011) defined underserved students as those who are from "historically underrepresented racial/ethnic minorities groups, transfer, first-generation, and part-time students" (p. 1). Participation in HIPs has been shown to have a compensatory effect for underserved students, in that the impact of participating is associated with larger gains relative to students from traditionally more advantaged backgrounds (Kuh, 2008; Kuh, Kinzie, Buckley, Bridges & Hyek, 2007; Brownell & Swaner, 2009).

The results of published HIPs equity studies have been mixed. While some studies have found lower percentages of traditionally underserved students participating than advantaged students (Kuh, 2008; Finley & McNair, 2013; NSSE, 2010; NSSE, 2012), other studies have not consistently observed a marked difference or differences as were hypothesized (Finley, 2011; Lydell & Gorny, 2015b). The aforementioned HIPs equity studies drew their results from the student engagement surveys administered to convenience samples, which limits the generalizability of these findings to settings that are represented in their sample. Finley and McNair (2013) found that students from some underserved populations participated less, on average, than their traditionally advantaged peers, some results were unexpected. They found that Hispanic and Asian students participated in fewer HIPs, on average, than White students. While there was not a

statistically significant difference between Black and White students' average number of HIPs in Finley & McNair's study, a difference in participation rates was observed in other studies (Kuh, 2008; Finley, 2011). Finley (2011) found that Hispanic students participated in HIPs at higher rates than White students. As a result of the mixed findings, Finley underscored the importance of comparing rates of participation between underserved students and students from traditionally more advantaged backgrounds, concluding that "patterns of relative advantage and disadvantage in HIPs participation are less clear" (p. 3). One commonality across studies was that first-generation students had lower participation rates (NSSE, 2010; NSSE, 2012; Kuh, 2008; Finley, 2011), and on average, participated in fewer HIPs than non-first-generation college students (Finley and McNair, 2013).

In summary, the work of ACC&U's LEAP initiative has served a pivotal role in helping post-secondary educators, administrators, accreditors, and researchers develop a common language to articulate what students should gain from attending college (outcomes), what high-impact educational practices are related to those gains (collegiate experiences), as well as developing tools that can measure gains and outcomes. Work by scholars involved with or using AAC&U's framework have focused on measuring the relationship between HIPs engagement and student learning outcomes (Keller, 2012; Kuh, Kinzie, Buckley, Bridges & Hyek, 2007; NSSE 2012; O'Neill, 2010; Riehe & Weiner, 2011; Kilgo, Sheets & Pascarella, 2015), and importantly, how engagement in HIPs impacts students from traditionally underrepresented groups (Kuh, 2008; Finley & McNair, 2013;

Finley, 2011; Eagan, Hurtado, Chang, Garcia, & Baribay, 2013). Assuming that HIPs engagement is related to the achievement of essential learning outcomes, and that employers seek employees that possess essential learning outcomes (Hart 2006; Hart 2008; Hart, 2013; Hart, 2015) it only stands to reason that students, regardless of their background, should have access to and equal representation in HIPs, especially since students from underserved backgrounds tend to benefit more from engaging in educationally purposeful activities than advantaged students (Kuh, 2008; Kuh, Kinzie, Buckley, Bridges & Hyek, 2007).

The Gap in Research

Many HIPs equity studies to date have drawn upon results from the National Survey of Student Engagement (NSSE) (Kuh, 2008; NSSE 2010; NSSE 2012; Finely, 2011; Finley & McNair, 2013). Students are asked to indicate if they participated in AAC&U's LEAP-defined HIPs. Upon first glance, while each study used a sample from different survey administration years, one would expect that the differences between traditionally underserved populations and more advantaged student participation rates would have some degree of consistency. The first important caveat is the fact that the NSSE samples that were used in these studies included a widely diverse set of institutional types. It is conceivable that students attending baccalaureate degree-awarding institutions may have different opportunities to participate in HIPs than research-intensive universities. Indeed, Kuh (2008) observed the highest HIPs participation rates at certain baccalaureate-degree-awarding institutions and research universities with very high research activity, HIPs

equity studies to date have not taken institutional type into account and instead sample from a conglomerate of institutional types.

The current literature on HIPs equity studies that either statistically controlled for institutional type or limited the sample to include only one institutional type; specifically, large, research-intensive universities, is scant. Additionally, of the ten AAC&U-defined HIPs, three are of particular salience in undergraduate education at the research universities (Boyer, 1998): research with faculty, internships, and senior theses/capstones. According to the Boyer Commission on Educating Undergraduates in the Research University (1998), research universities are in a unique position to draw upon their resources and offer these opportunities to students. Further, HIPs studies in general have been more focused on early academic career experiences, such as first-year seminars and learning communities. Other studies have focused on multiple LEAP-defined HIPs (Kilgo, 2016; Perez, 2016), but few have looked specifically at end-of-academic career (Keller, 2012). Not only can end-of-career HIPs be directly linked with postgraduate outcomes, seniors, being at the end of the academic career, would have had their full academic career to participate in research with faculty, internships, and culminating senior experiences (Kuh, 2008; NSSE, 2010; NSSE, 2012; Lydell & Gorny, 2015a).

Most HIPs equity studies calculate participation rates (Kuh, 2008; Finely, 2011) or take averages of cumulative counts of HIPs participation (Finley & McNair, 2013), which

may mask the fact that students can simultaneously be members of more than one group. For example, a student whose parent(s) graduated with a bachelor's degree could also consider themselves as Hispanic. Published HIPs equity studies did not parse out the unique contribution of students' membership in traditionally underserved populations relative to more advantaged peers. Also, published HIPS equity studies focused on some combination of race/ethnicity, first-generation status, full- or part-time status, sex, transfer student status, and non-tradition age groups.

Research suggests that equity gaps between lower- and higher-income college attendance rates, affordability, and graduation have remained constant since 1970, and in some cases, are even widening (Cahalan, Perna, Yamashita, Ruiz, & Franklin, 2016). Given the fact that a larger percentage of low-income students are entering universities, it is important to include measures of socioeconomic status when studying equitable HIPs participation. Published HIPs equity studies did not consider a full set of potentially important explanatory factors, such as students' financial circumstances and academic discipline, both of which could arguably influence HIPs participation rates, above and beyond student background characteristics. The exclusion of financial circumstances in HIPs equity studies is not surprising, given the fact that this data is hard to come by due to FERPA laws regarding private student data. Student engagement surveys provide an opportunity to gather self-reported socio-economic indicators, however, such indicators have been criticized as not being valid measures in other research settings (NCES, 2012; Walpole, 2007; Tarangeau, Rips, & Rasinski, 2000). Nonetheless, knowing that SES

continues to be an important explanatory construct in education attainment studies (NCES, 2012), it is important to (1) determine if financial circumstances impact HIPs participation, and (2) explore ways of measuring this construct through cost-effective means, such as student engagement surveys.

Expanding equity studies to assess the impact of students' finances and disciplinary field of study provides an important contribution to the extant dialogue regarding who participates in HIPs. Further, by using statistical modeling, such as stepwise logistic regression, allows for the examination of the influence of race/ethnicity, sex, and first-generation student status on HIPs participation, and subsequently, the explanatory value of adding student finances and disciplinary field indicators, above and beyond the traditional equity study indicators.

Conceptual Framework

HIPs equity studies to date have not directly specified an underlying conceptual framework. The emphasis has mainly been on describing what AAC&U's LEAP-defined HIPs are, understanding who has access to HIPs, and generally, how HIPs differentially impact outcomes for traditionally underserved and advantaged student groups. Outcomes have been measured by using self-reported learning and development items on student engagement surveys, such as the NSSE. The process of tying students background characteristics to HIPs participation, and then examining the impact of HIPs participation to AAC&U's (Kuh, 2008) essential learning outcomes fits well with Astin's (1993) theory of college student learning and development. Theories interested in examining

college impact emphasize the importance of controlling for student background characteristics, and combing the degree of involvement/engagement in the college environment, and the corresponding achievement of positive outcomes.

The focus on the collegiate environment, and linking specific aspects of that environment to desired outcomes (such as learning, development, retention, and graduation) is advantageous in building a wealth of literature regarding what key elements are associated with best-practice programming and accumulating evidence on the positive impact that college involvement can have on students. However, focusing solely on identifying quality indicators of HIPs within the collegiate environment, and aligning HIPs participation with positive student outcomes, does not capture the whole picture. The association between students' background characteristics and their participation in HIPs should also be examined to ensure equitable access to enriched educational experiences.

This present study draws upon Astin's (1993) Input-Environment-Outcome's (I-E-O) conceptual framework to better understand the unique contribution that students' background characteristics (inputs), coupled with their participation in HIPs (environment), will theoretically influence outcomes. This present study focuses on the input-environment portion of Astin's framework. According to Astin's theory, inputs such as race/ethnicity, sex, parental education, household income and socio-economic status, impact students' degree of involvement in the collegiate environment and

ultimately collegiate outcomes. Further, his theory states the importance of controlling for inputs before making assertions about college impact, as students grow and develop naturally across time, with or without college. He stated, "assessments of outcomes are affected by environments and will be biased unless we control for as many students' input characteristics as possible" (p. 19).

Based on this premise, Astin's (1993) theory emphasizes the inclusion of temporal distinctions when studying collegiate outcomes. Borrowing from the medical model, which emphasizes prognosis and treatment, treats students like patients; patients have a likelihood of getting better from an illness, with or without treatment. The importance is in teasing out the impact that the environment, or treatment, has on outcomes, after controlling for initial student characteristics. Temporal distinctions are accounted for in Astin's work by drawing upon stepwise multiple regression. Astin's analytical technique consists of entering four blocks of independent variables, in order, beginning with input characteristics of entering freshmen, bridge variables (input-environment) variables, between-college environmental variables and involvement and other intermediate outcome variables (p. 91).

While most of Astin's (1993) work focused on collegiate outcomes, he noted *that participation in programs can serve as an outcome in and of itself*. Extending this line of reasoning, HIPs participation can be considered an outcome, and student characteristics that impact participation can be modeled in steps to better understand inputs that impact

student decisions to participate. Building on Astin's temporal distinctions, before a student can become involved, they must experience a certain degree of exposure to the college environment. If students do not participate in educationally enriching activities like HIPs, then they are not exposed, and theoretically, may not become as involved.

Astin's (1993) theory of student involvement focused on factors that facilitate student growth as a result of being involved in the collegiate environment, defining student involvement as "the amount of physical and psychological energy that the student devotes to the academic experience" (Astin 1999, p. 518). He explained that involvement is reflected by behavior, not the student's feelings or thoughts, arguing that for growth and development to occur, students' need to actively engage in the environment. Astin's (1984) study described the involvement theory as having five basic postulates. Involvement refers to the investment of physical and psychological energy, occurring on a dynamic time continuum. Involvement can be measured quantitatively (frequency of behavior) and qualitatively (demonstration of behavior signifying levels of mastery), and positive student outcomes are directly associated with the quality and quantity of student effort. Finally, Astin (1984) put the onus of responsibility on institutions, stating "The effectiveness of any educational policy or practice is directly related to the capacity of that policy or practice to increase student involvement" (p. 519). Astin also stated that program participation, such as joining a fraternity or sorority, can be considered as an outcome in and of itself.

Astin's I-E-O theory can be particularly useful, as it places emphasis on understanding the impact that student inputs and the extent of involvement and engagement with the collegiate environment have on outcomes. Very much like other student experience surveys, NSSE's conceptual framework placed emphasis on what students do while they are in college, and argued that what they do is even more important than who they are and what college they attend (Kuh, 2003). Citing decades worth of research, Kuh (2003) concluded that the amount of time and effort that students devote to educationally purposeful activities is the best predictor of learning and personal development. Based on this conclusion, it was reasoned that institutional quality can be indicated by the extent to which the institution engages students in educationally purposeful activities, including HIPs. In Kuh's (2009) article, he elaborated on what he called the engagement construct, pulling together works from prominent scholars of college student research (Pace, 1980; Pace, 1984; Pace, 1985; Pace, 1990; Astin, 1984; Astin, 1993; Tinto, 1987; Tinto, 1993; Chickering and Gamson, 1987; Pascarella, 1985; Kuh, Schuh, Whitt and Associates, 1991; Kuh et. al. 2005). Kuh (2009) stated, "Today engagement is the term usually used to represent constructs such as quality of effort and involvement in productive learning activities" (p. 698), where productive learning activities now include AAC&U's LEAP-defined HIPs (as cited in Kuh, 2008).

Pascarella and Terrenzini's (2005) research on how college affects students also placed emphasis on what students do while they are in college: They found that positive outcomes are associated with students' active participation in collegiate environment. In

their extensive synthesis of the literature, they identified collegiate practices that enhance student growth and development in the cognitive, moral, and social domains. Further, they documented evidence that portrays how college impacts students by preparing them for the workforce after college. The key ingredient for positive outcomes hinges on the availability of opportunities for students to become engaged in high-impact educational experiences and practices.

Like Astin (1993), Pascarella and Terenzini, (2005), and Kuh (2003, 2009), Tinto (1993) asserted that positive student outcomes are related to students' level of exposure to learning opportunities within the collegiate environment and their degree of involvement in those opportunities. Tinto's theoretical constructs of academic and social integration also placed importance on what students do while they are in college. While the theory was devised as a means to explain student attrition, Tinto also stressed that students persistence decisions are largely a function of how involved, and integrated, the student becomes in the social and academic aspects of collegiate environment. Tinto's theory suggested that student involvement impacts how well students perceive that they belong at the campus, both socially and academically, and hence, how committed they will be to the goal of graduating from that institution.

All aforementioned conceptual frameworks underscore the importance of a deliberate attempt, on the institutions part, to actively create and promote opportunities that are empirically linked with enhancing student engagement/involvement, both inside and

outside of the classroom. Some scholars put the onus on students to become involved and to learn to fit in and assimilate with the college experience, while breaking away from their home communities and traditional norms, values, and ways of being. Other scholars assert that institutions have the responsibility to provide opportunities for students to become engaged in ways that are inclusive to students who are not from dominant white cultural norms (Quaye & Harper, 2009). Again, the quality of the collegiate programming can be gauged, to some extent, by the ability of those experiences to engage students from underrepresented and traditionally underserved backgrounds.

Intentional effort on the part of the institution is needed to ensure that opportunities are of high-quality. In order to enhance students' active engagement and involvement in educational experiences, Chickering and Gamson (1987) provided a well-known list of best-practices in their article, *Seven Principles for Good Practice in Undergraduate Education*. They asserted that good practice in undergraduate education encourages student-faculty contact, fosters cooperation between students, uses active learning, provides meaningful feedback, emphasizes time on task, communicates high expectations, and respects diverse talents and ways of learning (p. 2). While Chickering & Gamson's work mainly focused on teaching and learning, they also emphasized the use of high-impact practices at a program level, such as learning communities, freshman seminars, internships, and undergraduate research. The seven principles for good practice provided guidelines that help ensure that high-impact practices, when done well, enhance desired student outcomes.

Purpose of the Study

In summary, since it is the interaction between the student and the environment, and the degree of student involvement and engagement in that environment, that helps produce desired outcomes, then it stands to reason that access is of primary importance. As mentioned, this study uses Astin's (1993) popular conceptual I-E-O model as a framework for understanding the interplay between students' background characteristics and their access to high-impact practices within the collegiate environment. The focus of this study examines inputs, or student background characteristics, that are associated with participation in high-impact practices, like undergraduate research, internships, and senior theses/capstones. According to Astin's model, if these experiences are designed in ways that encourage student engagement, then desired outcomes should be achieved. Studying the link between student engagement in HIPs (environment) and desired student outcomes is beyond the scope of this dissertation. An enhanced understanding of who participates in HIPs starts the conversation. As students from increasingly diverse backgrounds attend colleges and universities, attention should be on providing and promoting inclusive opportunities to ensure that students become engaged in the collegiate environment (Bensimon,2004; Finley, 2011; Finley & McNair, 2013; Kuh, 2008) . If students from traditionally underserved backgrounds do not participate in HIPs at the same rate as students from traditionally more advantaged backgrounds, they do not have the opportunity to become as involved and engaged, and, theoretically, have the same advantage for achieving positive student outcomes as their more privileged peers. Building on the idea that institutions bear the responsibility for creating inclusive

environments, it is essential that institutions start at the beginning, ensuring that students have equal opportunity and promotion to benefit from programs and services that are linked with positive outcomes.

Research Questions

The relationship between student background characteristics and HIPs participation is not well understood in extant HIPs equity studies. Thus, the research questions for this study are as follows:

(1) Do seniors from traditionally underserved ethnic/racial, sex, and first-generation backgrounds have lower odds of HIPs participation relative to their traditionally advantaged peers?

Replicating extant research studies by using the same measures of race/ethnicity, first-generation student status, and sex allows for the comparison of results across studies.

(2) Does the inclusion of students' financial circumstances add value in explaining HIPs participation, above and beyond a model containing traditional equity study indicators of race/ethnicity, sex, and first-generation student status?

Evaluating whether financial circumstances impact HIPs participation rates, above and beyond the base model, is important, as students from lower-income and social class backgrounds may also be underserved, and therefore, may not reap the benefits associated with participating in HIPs.

(3) Does academic discipline impact HIPs participation, above and beyond traditional equity study indicators and seniors' financial circumstances?

It is important to examine the influence of disciplinary field of study when considering who participates in HIPs, as some disciplines may inadvertently create a barrier to participation in research with faculty, internships, and senior thesis capstones.

Phase I and II of Study

Since one of the primary purposes of conducting this study is to evaluate whether the inclusion of financial indicators, namely self-reported parental household income and perceived social class, it is important to provide some examination of construct validity evidence to assess whether these items indeed reflect parental household income and SES. Therefore, the validity study (hereafter referred to as Phase I) is included. This validation work is supported by considering studies regarding the measurement of socioeconomic status in addition to providing an overview of empirical studies related to the primary three research questions in this study.

The Methods and Results sections will be broken into two parts: Phase I and Phase II. Phase I will use students' self-reported parental income and social class, which will be paired with financial aid records at one research university that administered the SERU survey. Phase II concerns itself only with answering the primary research questions regarding equitable participation in HIPs, as listed above.

Chapter Two: Literature Review

This section first provides an overview of the context and political landscape surrounding AAC&U's work on mapping HIPs to essential learning outcomes. Second, literature is explored regarding the effectiveness of HIPs. Third, studies that used AAC&U's HIPs definitions to better understand HIPs access for traditionally underserved students, hereafter referred to as HIPs equity studies, will be reviewed. The HIPs of interest in this study include "research with faculty", "internships", and "senior thesis/capstone" experiences, thus, literature regarding the effectiveness of and equitable access to these particular HIPs will be explored. Fourth, literature regarding student background characteristics (race/ethnicity, parental educational attainment, and financial circumstances, and disciplinary field of study) that have been shown to be associated with HIPs participation will be reviewed. Finally, literature reviewing validity evidence of self-reported financial indicators will be discussed.

Background

Institutions of higher education have been increasingly called upon to demonstrate institutional effectiveness, and specifically, to provide evidence that they have contributed to student learning outcomes desired by the workforce and society at large. As Carol Schneider, President Emeritus of the American Association of Colleges and Universities (AAC&U) stressed, "the 'college success' question encompasses not only whether students have earned a degree, but also whether graduates are in fact achieving the level of preparation—in terms of knowledge, capabilities, and personal qualities—

that will enable them to both thrive and contribute in a fast-changing economy and in turbulent, highly demanding global, societal, and often personal contexts" (as cited in Kuh, 2008, p. 1). Moving beyond traditional indicators of student success, such as retention, graduation, and grade point average, is necessary to gauge a full portrait of the skills that students possess upon graduation, and how institutions can be deliberate in creating enriched educational opportunities to enhance student learning outcomes for both traditional and underserved college students.

Publications have demonstrated that undergraduates do not graduate with the skills that they need to successfully perform in the workforce when the graduate (Bok, 2005; Arum & Roska, 2014). Further, employer surveys across time have repeatedly demonstrated that new graduates lack the skills that employers find most valuable (Hart, 2006; Hart 2008; Hart 2013; Hart 2015). In 2005, a Commission on the Future of Higher Education was created to evaluate the condition of higher education in the United States, under Secretary of State, Margaret Spellings. The Commission released a powerful report in 2006 that stressed the importance of demonstrating accountability in higher education. Around the same time that the Spellings Report was released, initiatives began to surface across the country to increase transparency and illuminate evidence of how higher education contributes to valuable student learning outcomes. The National Institute for Learning Outcomes Assessment (NILOA) was created in 2008 with a mission to "discover and disseminate ways that academic programs and institutions can productively use assessment data internally to inform and strengthen undergraduate education, and

externally to communicate with policy makers, families and other stakeholders" (NILOA, 2012). NILOA claims that this pivotal Spellings (2006) report triggered associations like Association of Public and Land-grant Universities (APLU) and the American Association of State Colleges and Universities (AASCU) to develop a Voluntary System of Accountability (VSA) as a proactive response (Jankowski, Ikenberry, Kinzie, Kuh, Shenoy, & Baker, 2012). Data submitted to the VSA continues to serve a two-prong mission: to make data available to the public that could also serve as approved indicators for accreditation bodies like the Higher Learning Commission. Another initiative designed to help institutions of higher education become more deliberate in their efforts to enhance student learning and workforce preparation was spearheaded by the Association of American Colleges and Universities (AAC&U, 2002).

The AAC&U has a rich history of serving as an association that brought together colleges across the country for over 100 years to help define a purpose of a college education and a set of standards of for effective practice (Eisenmann, 2015). While the association's primary mission has changed over time, in 1995, they committed to serve all institutions that provided a liberal education, regardless of public or private status, and articulated the need to address inequalities in access and achievement for college students from underrepresented backgrounds. Further, AAC&U has served as a voice for promoting quality liberal education, and in 2005 (right around the time of the Spelling Report), forged the Liberal Arts Education and America's Promise (LEAP) initiative, which underscored the importance of a liberal education in preparing students to possess the

skills necessary to succeed in the twenty-first century and contribute to the democratic nation.

The LEAP initiative is a "national advocacy, campus action, and research initiative that champions the importance of a twenty-first-century liberal education—for individual student success and for a nation dependent on economic creativity and democratic vitality" (AAC&U, n.d., p. 1). The LEAP Initiative advocates for an educated workforce and engaged citizens. Colleges and universities across the country have taken the LEAP challenge to ensure that graduates possess higher-order thinking skills, broad knowledge, and real-world experience. The LEAP initiative has provided a framework designed to make excellence inclusive, which includes

(1) Essential Learning Outcomes
(2) Authentic Assessments
(3) High-Impact Educational Practices (HIPs)

Essential Learning Outcomes were collaboratively devised through dialogue with higher education professionals and the business community, as well as analysis of reports and accreditation standards over a multi-year period to promote essential learning outcomes and align them for success in life and the 21st century workplace (Kuh, 2008). In Kuh (2008), AAC&U noted that the list was devised from previous publications (AAC&U, 2002; AAC&U, 2004; AAC&U, 2005).

Through the LEAP initiative, High-Impact Educational Practices (HIPs) or practices offered by institutions that intentionally engage students, were articulated and linked to Essential Learning Outcomes. HIPs include first-year programs, intensive writing, collaborative assignments, undergraduate research, service-learning, internships, learning communities, diversity experiences, and culminating senior thesis/capstone projects. According to Kuh (2008), these educational practices were identified as HIPs through "an extensive literature has established the value of active, engaged, and collaborative forms of learning for students….[reflecting] more than two decades of work on campus to translate these broad research findings into curriculum and pedagogy" (p. 10).

While Kuh (2008) contended that the HIPs list is not exhaustive, the justification of the selection was based on the premise that HIPs participation can start in the freshman year and continue through the senior year, providing a "cornerstone to capstone framing that potentially fosters active intellectual engagement and practice across the entire educational experience" (p. 10). Some experience, like intensive writing, collaborative assignments, and service-learning could occur at any time in students' careers, some are marked by timing. Learning communities and first-year seminars are typically freshman-year experiences, and other experiences, like intensive writing, collaborative assignments, service-learning, diversity experiences can happen at any time during the students' academic careers. Undergraduate research, internships, and senior capstones typically occur later, after students have had the opportunity to gain a foundational grasp

of the core knowledge, discipline-specific skills, and career interests to allow for full engagement in the experience.

The common thread across the identified HIPs is the potential for the experience to foster active intellectual engagement across students' entire academic careers. Brownell & Swaner (2009) conducted a literature review on HIPs and corresponding student outcomes. They found that overall, participation in HIPs led to increase in traditional measures of student success like persistence as well as "increases in critical thinking and writing skills, greater appreciation of diversity and diverse viewpoints, and higher levels of engagement, both in and out of the classroom" (p. 27). They added that unfortunately, the vast majority pf HIPs studies focused on persistence and graduation and not student learning outcomes.

In summary, the work of ACC&U's LEAP initiative has served a pivotal role in helping post-secondary educators, administrators, accreditors, and researchers develop a common language to articulate what students should gain from attending college (outcomes), what high-impact educational practices are related to those gains (experiences), as well as developing tools that can measure gains and outcomes. Work by scholars involved with or using AAC&U's framework have focused on measuring the relationship between HIPs engagement and student learning outcomes (Keller, 2012; Kuh, Kinzie, Buckley, Bridges & Hyek, 2007; NSSE 2012; O'Neill, 2010; Riehe & Weiner, 2011; Kilgo, Sheets & Pascarella, 2015), and importantly, how engagement in HIPs impacts students from

traditionally underrepresented students (Kuh, 2008; Finley & McNair, 2013; Finley, 2011; Eagan, Hurtado, Chang, Garcia, & Baribay, 2013; Kilgo, 2016). Assuming that HIPs engagement is related to the achievement of essential learning outcomes, and that employers seek employees that possess essential learning outcomes (Hart 2006; Hart 2008; Hart, 2013; Hart, 2015) it only stands to reason that students, regardless of their background, should have access to and equal representation in HIPs, especially since students from underrepresented backgrounds tend to benefit more from engaging in educationally purposeful activities than majority students (Kuh, 2008; Kuh, Kinzie, Buckley, Bridges & Hyek, 2007).

Effectiveness of High-impact Practices

Kuh (2008) surmised six elements as to why high-impact practices are effective. First, they demand a considerable investment of students' time and effort, which deepens their investment and commitment to the college. Second, they put students' in the position to frequently engage with faculty and peers about substantive matters and are invested in seeing the student succeed. Third, students are more likely to interact with people who are different from them in fundamental ways. They are challenged to develop new ways of thinking as a response to interacting with diverse others. Fourth, HIPs often offer the opportunity to receive direct feedback about their performance. Fifth, students are required to synthesize, integrate, and apply knowledge, which is essential to deep learning. Sixth, participating in HIPs can be life changing by enhancing students' abilities to understand themselves and gain confidence while navigating the complexities of life.

HIPs experiences have the potential for encouraging students to increase their personal awareness and understanding of themselves, including a cognitive elaboration on their values and beliefs.

Kuh (2008) found a strong, positive association between participation in six HIPs (learning communities, service learning, study abroad, student-faculty research, study abroad, service learning, internships, and senior thesis/capstones) and student outcomes, after controlling for demographics and institutional variables. Kuh used the National Study of Student Engagement (NSSE) survey scales, which were constructed from freshmen and senior's self-reported learning, practical skill competencies and general gains. Students indicating that they participated in HIPS were also found to have engaged in deep learning. The deep learning scale is constructed from students' responses to items measuring the frequency of behavior on a four-point Likert scale. The scale is made up of three subscales: higher-order learning , integrative learning, and reflective learning (Laird, Shoup, & Kuh, 2005). Based on the findings by Laird, Shoup, and Kuh (2005), Kuh (2008) asserted that "In contrast to surface-level learning, deep-level processing emphasizes both acquiring information and understanding the underlying meaning of the information. Deep approaches to learning are important because students who use these approaches tend to earn higher grades and retain, integrate, and transfer information at higher rates" (p. 14). While HIPs participation was statistically associated to gains and deep learning (α=0.001), unfortunately, detailed methodology of sampling, analytic techniques and effect sizes were not reported.

Similar results were observed by Finley (2011) when using a 2006/2008 NSSE sample (average estimated response rate of 27%) that was drawn from the California State, Oregon and Wisconsin State University systems. Using averages across the three state systems, Finley calculated the effect size estimates of HIPs participation on deep learning and self-reported gains. Seniors' participation in *faculty research* had the largest effect on deep learning (~0.42), followed by practical gains (~0.25), personal gains (~0.23) and general gains (~0.20). Participation in *internships* had the largest effect size for practical gains (~0.23), followed by deep learning (~0.20), general gains (~0.15), and personal gains (~0.12). Participation in *senior theses/capstones* had the strongest effect in deep learning (0.24), practical gains (0.20), and personal gains (0.15). In summary, Finley's study suggested that participating in research with faculty and senior theses/capstones has the largest impact on deep learning and internships have the largest impact on practical gains.

Assuming that HIPs engagement is related to the achievement of essential learning outcomes, and that employers seek employees that achieved essential learning outcomes (Hart 2006; Hart 2008; Hart, 2013; Hart, 2015) it only stands to reason that students, regardless of their background, should have access to and equal representation in HIPs, especially since students from underrepresented backgrounds tend to benefit more from engaging in educationally purposeful activities than majority students (Kuh, 2008; Kuh, Kinzie, Buckley, Bridges & Hyek, 2007).

Equity and high-impact practice participation.

The AAC&U 2005 LEAP Initiative provided an invaluable set of definitions linking high-impact practices, or from the student perspective, high-impact experiences, to consensually-derived essential learning outcomes. Schneider and Albertine (2013) marked George Kuh's (2008) publication of *High-impact Educational Practices: What They Are, Who Has Access to Them, and Why They Matter* as sparking a conversation in the higher education community that came at the perfect time. They stated,

> In the first decade of the twenty-first century, the learning outcomes movement was gaining traction on campuses. In 2005, AAC&U had launched LEAP, its centennial campaign. By 2008, the Essential Learning Outcomes advanced by LEAP were gathering consensus. When AAC&U issued High-Impact Educational Practices as a signature LEAP publication, the campaign was moving. AAC&U's membership wanted to address learning outcomes, engaged learning practices, and assessment together (p. vi).

While high-impact practices were not new strategies, having a set of definitions and common dialogue spurred campus decision-makers to be more intentional in their practice. Kuh's work was one of the first to link NSSE respondents' reported participation in LEAP-designated HIPs with self-reported student outcomes.

Since the release of Kuh's (2008) study, I identified 13 dissertations that specifically studied high-impact practices, as defined by AAC&U's LEAP initiative definitions (retrieved on 2/26/17 from ProQuest Digital Dissertations).The majority of the dissertations were quantitative in nature and conducted at single institutions. Some research focused on specific types of high impact practice (study-abroad, internships, service-learning, research with faculty) and corresponding impact (Keller, 2012; Johnson, 2016). A few dissertations emphasized the experience of traditionally educationally disadvantaged students. Other studies focused more at the institutional level, including HIPs in strategic planning and assessment (Perez, 2016). While this list of studies is in no way exhaustive, it provides a snapshot of how new scholars are drawing upon AAC&U publications and applying it to study the impact of LEAP-defined HIPs, whether at the institutional or student level.

In their review of the literature on five HIPs (first-year seminars, learning communities, service learning, research with faculty, senior theses/capstones), Brownell & Swaner (2009) found that "most studies involve single institutions, programs, or classes. Since each of the high-impact activities varies widely in practice, it is often impossible to generalize research findings, or to identify which program component leads to a particular outcome" (p. 27). Further, they noticed that studies had methodological issues, such as a lack of comparison groups, use of convenience samples, reliance on self-reports, and were not longitudinal in nature. Of the very few studies that considered the experience of students from underserved populations, most of them only used

demographic data to describe the sample and not in the analysis of equitable access to HIPs. Based on my review of dissertations drawing upon LEAP-defined HIPs that have been posted in Digital Dissertations, I conclude that the studies mirror Brownell & Swaner's findings; the majority were performed at single institutions and only a few focused specifically on the experiences of underserved or educationally disadvantaged students.

While the primary research questions have revolved around HIPs and outcomes, many of these same studies continue to point to the importance of surveying student access to HIPs, and whether students have an equitable chance of participating (Kuh, 2008; Finley & McNair 2013; Finley 2011). In these studies, examining the question of who participates in HIPs were of secondary importance to the primary purpose of linking HIPs participation to student outcomes for diverse students, many of which were based on composite scores based on student survey responses.

Whether students have equitable access to HIPs has generally been measured by comparing participation rates of underserved and advantaged students. Finley (2011) defined underserved students as "historically underrepresented racial/ethnic minorities, transfer, first-generation, and part-time students." (p. 2). Indeed, Finley and McNair's (2013) used this delineation when observing the association between HIPs participation and students' perceptions of their learning (after controlling for sex, age, class level, transfer status, and first-generation status). Research to date does not include other

student factors that could be barriers to equitable access to HIPs. Researchers have noted that focusing on race/ethnicity, first-generation status, and other demographics does not fully capture the uniqueness of the student experience. Finley (2011) noted this limitation by stating, "the heterogeneity of students across race and ethnicity and socioeconomic class creates different opportunities, paths, and experiences of learning for these students on campuses" (p. 5). Including other factors, like financial circumstances, may provide more insight into explaining why certain students engage in HIPS at higher rates than other students.

The reliance on percentages as equity measures is evidenced in the University of California's Center for Urban Education's (CUE) Equity Scorecard. CUE created the grant-funded Equity Scorecard to help address the achievement gap for historically underrepresented students. Noticing that equity metrics were not commonly measured in relation to underrepresented students' outcomes, Bensimon (2004) urged, "We must deliberately and energetically remove the conditions that deny or impede equitable outcomes for all students. The Diversity Scorecard is a tool and a process to help campuses assess their effectiveness in providing historically underrepresented students with the credentials they will need to gain economic, social, and political power" (p. 46). By engaging in the Equity Scorecard and using the tools, higher education practitioners can establish an ongoing process and dialogue of considering underserved students' access, representation, and barriers to participation in educational opportunities. In more recent work, Bensimon (2007) described the importance of 'equity-mindedness' as being

"cognizant that exclusionary practices, institutional racism, and power asymmetries impact opportunities and outcomes for Black and Latina/o students….[and] attribute unequal outcomes among Black and Latina/o students to institution-based dysfunctions" (p. 446). In contrast, she defines 'deficit-mindedness', which the Equity Scorecard was designed to change, as "[construing] unequal outcomes as originating from student characteristics" (p. 446).

One component of the Equity Scorecard process is working with the Equity Toolkit. The Equity Toolkit requires data regarding underserved students' representation in the population and in a program. Bensimon, Dowd, and Hanson (as cited in Finley & McNair, 2013) presented an example of using the Equity Toolkit in Finley and McNair's (2013) publication *Assessing Underserved Students' Engagement in High-impact Practices.* They described, "By providing intuitive, interactive tools that help illustrate and 'make real' the racial inequities that exist on campuses, CUE creates opportunities for practitioners to become more 'equity-minded' in the ways they interpret and support students' success" (p. 36). The Toolkit process starts with identifying HIPs across campus to assess for equity and ends with establishing and monitoring equitable benchmarks. The first step is to examine if there is a discrepancy in what Bensimon et al. describe as 'representation'. A discrepancy in representation would be evident if the percentage of students participating in a program, for instance, is less than the percentage of the students in the population. Next, data would be collected to see if institutional barriers to 'access' exist, such as program participation requirements, which would

inadvertently limit participation by students of color. There are more steps to the process that are beyond the scope of this dissertation but readers are encouraged to visit USC's Center for Urban Education (n.d.) website to learn more about the Equity Toolkit.

While the Equity Toolkit can be helpful for practitioners working concretely on addressing equity issues on campuses, calculating simple percentages without accounting for the fact that students can simultaneously belong to different underserved groups, such as low-income/working-class students who are racially/ethnically diverse, may not prove as useful for researchers trying to assess HIPs for equity at a more macro level. It must be noted that the intent of the Equity Toolkit was to assist practitioners in being 'equity-minded'. The Equity Toolkit was presented to highlight the beneficial features of the tool to readers interested in assess equity. While literature about use of the Equity Scorecard has focused on race/ethnicity, it can be used to examine other demographic characteristics associated with power and privilege, including financial circumstances (Lydell & Gorny, 2015b). The point here is that much of the reviewed equity research relies heavily on comparing simple percentages within student populations, and does not take into account the intersectionality of students' multiple identities (Museus & Griffin, 2011). These methods also fail to control for confounding variables when parsing out the contribution of race/ethnicity, sex, first-generation status and other student characteristics that may have a unique impact on HIPs participation.

Kuh (2008) referred to a 'compensatory effect' when looking at the differential impact that participating in HIPs has on underrepresented and traditionally disadvantaged students compared to their majority peers. According to Kuh, many of the effects of college are conditional (Pascarella & Terenzini, 2005) in that some students appear to benefit more than others from the same educational programs or practices, all things considered (Kuh, Kinzie, Buckley, Bridges & Hyek, 2007). Kuh (2008) found that while all students who devoted time during the first-year in educationally purposeful activities earned higher GPAs, students with lower ACT scores made greater gains in GPA, suggesting that as these students became more engaged, they made up ground in terms of grades point average. He also found that first-year Black and Hispanic students who engaged in educationally purposeful activities had higher probabilities of persisting through their second year than white students who were engaged at similar levels. Based on his findings, he concluded that "while participation in effective educational activities generally benefits all students, the salutary effects are even greater for students who begin college at lower achievement levels, as well as students of color, compared with white students." (p. 19). Based on Brownell and Swaner's (2009) review of the literature also found that HIPs, when they are carefully designed, are valuable programs for all students, but especially so for underrepresented minority, low-income, and first-generation students.

Given these findings, it is important to gather evidence regarding who has access to and participates in HIPs. Studies to date have shown mixed results in terms of

'representation' of traditionally underserved students in HIPs. While some studies have found lower percentages of traditionally disadvantaged students participating than more advantaged students (Kuh, 2008; Finley & McNair, 2013), other studies have not consistently observed a marked difference between traditionally underrepresented students (Finley, 2011). While Finley and McNair (2013) found that students from some underserved population participated less, on average, in HIPs than their traditionally advantaged peers, some results were unexpected.

Finley (2011) underscored the importance of comparing rates of participation between underserved students and students from traditionally more advantaged backgrounds. Drawing upon self-reports of participation in HIPs, as measured on an aggregated sample of 2006/2008 NSSE responses, Finley (2011) concluded that "patterns of relative advantage and disadvantage in HIPs participation are less clear" (p. 3). Participation rates for internships were highest for Hispanic seniors (54%), followed by White (50%), Asian (43%), and Black (42%) seniors. Participation rates for faculty research were very similar across racial/ethnic groups (ranging between 18-20%). Participation rates for senior theses/capstones were similar for White and Hispanic students (30%), Asian (26%) and Black (24%) seniors. In summary, Black seniors had the lowest participation rates in internships and senior theses/capstones. Kuh (2008) also found that Black students and first-generation students participated at lower rates than White and non-first-generation students, respectively.

Finley and McNair (2013) found that, on average, Hispanic and Asian American students engaged in fewer HIPs than White students. In contrast to other HIPS equity study findings (Kuh, 2008; Finley, 2011), a statistically significant difference was not found between Black and White students. Also, first-generation students participated in fewer HIPs, on average, than their non-first-generation peers. Unexpectedly, transfer students, who are typically considered to be at an academic disadvantage compared to their non-transfer student peers, participated in a significantly more HIPs than non-transfer students. Considering the fact that Finley and McNair measured HIPs participation by averaging participation in zero to six high-impact practices, the observed differences do not necessarily mean that the differences are meaningful. Please note that the range of average HIPS participation is between 1.22 and 1.45 for all student groups. It would be more remarkable if the average number of HIPs participation for a traditionally advantaged group was 3, for instance, when the average for a traditionally disadvantaged group was 1. Nonetheless, due to the somewhat mixed results, they concluded "These results underscore the need to carefully examine who is participating in high-impact practices. When evaluating the effects of high-impact practices and targeting related programmatic improvements, it is essential to gather evidence of the degree to which particular groups of students are or are not participating in these practices" (p. 8).

Again, the research shows that participation in these high-impact practices is far from the norm (Brownell & Swaner, 2009). Kuh (2008) calculated the percentage of students participating in research with faculty for the NSSE sample (see Table 1). While these

percentages do not take into account seniors' membership in multiple categories, such as race/ethnicity and full- or part-time-status for instance, they still provide a snapshot of who participated in HIPS, in an absolute sense, across the NSSE sample. He found that a larger percentage of seniors at more-selective institutions participated than those at less selective institutions. Kuh also observed the highest participation rates at certain baccalaureate-degree-awarding institutions and research universities with very high research activity.

Table 1.

HIPs Participation Rates by Seniors' Background Characteristics and Institutional Setting as Measured by NSSE.

	Faculty Research %	*Internships* %	*Senior Thesis* %
Institutional Char.			
Doc RU-VH	23	57	29
Doc RU-H	19	51	33
DOC DRU	17	51	33
Masters - L	16	48	30
Masters - M	17	52	30
Masters - S	18	51	36
Bac - A&S	29	66	55
Bac - Diverse	18	60	37
Other	15	49	29
Sector			
Public	18	51	36
Private	23	61	42
Barron's Selectivity			
Less Selective	16	48	30
More Selective	23	59	35
Ethnicity			
African American/Black	17	45	27
Asian/Pacific Islander	22	50	28
Caucasian/White	19	56	34
Hispanic	17	45	26
Other	19	46	31
Enrollment			
Part-time	12	38	22
Full-time	21	56	35
First-generation			
No	22	57	36
Yes	16	48	29
Transfer			
No	23	61	38
Yes	14	43	25
Age			
Under 24	23	61	37
24 and Older	13	40	24

One can see from perusing Table 1 that traditionally advantaged students (White, non-first-generation, traditionally aged, full-time, and non-transfer) participated at a greater rate than their less advantaged peers. These results highlight the importance of ensuring that students from all backgrounds have equitable access to high-impact practices that are associated with positive student outcomes and workforce and/or graduate school preparation.

Lydell and Gorny (2014) found that a smaller percentage of seniors responding to the 2012 SERU survey, in comparison with 2012 NSSE data, participated in senior theses and capstones, internships, and a larger percentage participated in research with faculty. This is an expected finding, considering the differing missions of institutions in the NSSE compared with the SERU survey population. The former is a conglomerate of diverse institutional types, whereas the latter population of interest is limited to students attending research universities with very high research activity. About 4% of NSSE institutions were considered as such.

The SERU and NSSE surveys sample from different populations. While research regarding equitable participation in HIPs has drawn from a conglomerate of institutional studies, perhaps aggregating on a macro level of the NSSE universe masks patterns of participation rates that are typical within an institutional type. Lydell and Gorny (2014) found that HIPs participation rates were lower for the SERU sample than the NSSE

sample (with the exception of research with faculty). Again, SERU institutions are large, research-intensive universities and may fundamentally differ from NSSE institutions.

Research with faculty.

Providing undergraduate students with opportunities to participate in research with faculty has increased in importance over the years, with some citing the Boyer Commission on Educating Undergraduates 1998 report and 2002 follow-up as a springboard for this effort at research universities (Riehl & Weiner, 2011; Katkin, 2003). The Boyer Report (1998) was funded by the Carnegie Foundation for the Advancement of Teaching under the belief that undergraduate education at research universities was subpar and that certain enriched experiences, like making research- and inquiry-based learning a regular part of the curriculum was the exception rather than the rule. The Report argued that oftentimes, undergraduate education at research universities tends to emphasize the transmission of knowledge from faculty scholars to students. Research universities draw a diverse and often international community and emphasize the creation of new knowledge. By providing undergraduates multiple opportunities to conduct research with faculty, the Boyer Report argued, universities are capitalizing on their unique position and strengths.

An entire issue of Peer Review (Spring 2010) was dedicated to the topic of undergraduate research. One contributing author, Lopatto (2010), while not connecting his research directly to the study of undergraduate research as an AAC&U LEAP-defined practice,

did acknowledge their work on mapping high-impact practices. Lopatto's research in this area often used the Summer Undergraduate Research Experience (SURE) survey. Students indicated "gains on a variety of disciplinary skills, research design, information or data collection and analysis, information literacy, and communication" (p. 27), as well as perceived opportunities for professional development through research presentations, publications, and networking, as well as clarifying a career path. Lopatto's work consistently documented the positive impact of participating in undergraduate research (Lopatto, 2003; Lopatto 2004; Lopatto, 2006).

While undergraduate research experiences have primarily been enjoyed by students in the sciences, universities are increasingly making the opportunity for students in all disciplines (Kuh, 2008). Kuh described undergraduate research as an experience where faculty are "reshaping their courses to connect key concepts and questions with students' early and active involvement in systematic investigation and research….[involving] students in actively contested questions, empirical observation, cutting-edge technologies, and the sense of excitement that comes from working to answer important questions" (p. 10). AAC&U (as cited in Kuh, 2008) considered research with faculty as a HIP based on an extensive literature review, as summarized in Pascarella and Terenzini's (2005), *How College Affects Students: A Third Decade of Research*. Lopatto (2003) noted that the essential features of undergraduate research included students' engagement in the scientific research process, from conducting literature reviews, formulating research questions, gathering and analyzing data, and reporting results, both through writing and

orally. Admittedly, the gross measurement of whether students' participated in HIPs does not provide the level of detail necessary to evaluate program alignment with these key elements. Nonetheless, studies using the measure of participation have provided some evidence that research with faculty is linked to positive student outcomes.

According to Riehl and Weiner's (2011) review of the literature between 1999 and 2010, "Studies reported academic and personal gains among students who participated in these experiences, including increased confidence in their research and science-related abilities, career and graduate school preparation and clarification, and skills such as lab/field techniques, communication, and teamwork" (p. 132). They cited scholars studying student outcomes associated with research with faculty (Seymour, Hunter, Laursen, & DeAntoni, 2004; Lopatto, 2004; Bauer & Bennett, 2003; Kardash, 2000). Riehl and Weiner also found evidence to suggest that high-impact practices such as undergraduate research and senior capstones enhanced students' information literacy.

Using responses from the NSSE 2000 survey administration at universities and colleges from across the United States, Kuh (2008) found a positive association between seniors' research with faculty and deep learning, as well as their perceptions of personal, general, and practical skills gains. He also found that seniors' participating in research were more engaged overall with clusters of educational practice, including level of academic challenge, active and collaborative learning, student-faculty interaction supportive campus environment. He attributed his findings to the fact that these students spend a fair

amount of time with faculty, thus giving them insight into how they think and deal with challenges during the research process. In their review of the literature, Brownell and Swaner (2009) found that "Students who participate in undergraduate research are more likely to continue to graduate school, are more satisfied with their overall educational experience, and demonstrate greater problem-solving and research skills" (p. 27). Similarly, Kuh, Kinzie, Buckley, and Hyek (2007) found that students that participated in faculty research were more likely to persist, gain intellectually and personally, and choose a career related to their undergraduate research project.

The majority of studies examining the impact of participating in faculty research were interested in the overall undergraduate student experience. Some studies focused on the impact of participation for underrepresented students in particular (Eagan, Hurtado, Chang, Garcia, Herrera, and Garibay, 2013; Kuh, 2008). Findings suggested that students from underrepresented backgrounds may benefit more from participating in undergraduate research than traditional undergraduates in terms of positive gains and articulated graduate school plans in either STEM or non-STEM fields (Eagan et al., 2013). Kuh (2008) also found a compensatory effect of participation in HIPs like undergraduate research, in that students from underrepresented backgrounds tended to have more enhanced gains and academic performance than White students that participated in the same experiences.

Given the positive outcomes associated with faculty research, it is imperative that these experiences are accessible for all students, especially those who have been traditionally underserved in higher education. Lydell and Gorny (2014) compared faculty research participation rates for different student groups by comparing the results from the 2012 SERU survey with the 2012 NSSE survey and found noticeable patterns in participation rates by ethnicity, age, transfer status, first-generation status, and academic field of study. Added to this analysis are the participation rates documented in Kuh's 2008 study, which was based off of NSSE 2000 seniors' self-reported participation in faculty research (see Table 2).

Table 2. *A Comparison Between Seniors' Faculty Research Participation Rates for NSSE and SERU Survey Samples.*

	Kuh 2008 %	*NSSE 2012* %	*SERU 2012* %
Institutional Characteristics			
Doc RU-VH	23	26	40
Doc RU-H	19	20	-
DOC DRU	17	13	-
Masters - L	16	18	-
Masters - M	17	19	-
Masters - S	18	22	-
Bac - A&S	29	33	-
Bac - Diverse	18	20	-
Race/ethnicity			
African American/Black	17	18	35
Asian/Pacific Islander	22	24	41
Caucasian/White	19	20	36
Hispanic	17	18	34
Enrollment			
Part-time	12	11	-
Full-time	21	22	-
First-generation			
No	22	24	42
Yes	16	16	37
Transfer			
Started Here	23	25	44
Started Elsewhere	14	14	33
Age			
Under 24	23	26	42
24 and Older	13	12	33
Major Category			
Arts & Humanities	-	20	24
Biological Sciences	-	42	62
Business	-	10	24
Education	-	13	26
Engineering	-	29	45
Physical Sciences	-	41	48
Professional (Other)	-	15	40
Social Sciences	-	24	40

A larger percentage of SERU survey seniors attending research universities participated in research with faculty compared with NSSE seniors attending diverse institutional types. With the exception of Baccalaureate Arts and Sciences NSSE respondent institutions, a smaller percentage of NSSE seniors at all other institution types participated in research with faculty in comparison with research universities. A larger percentages of seniors from all racial and ethnic backgrounds in the SERU sample participated in faculty research than in the NSSE samples.

Black and Hispanic students had smaller participation rates than White and Asian students, however, the difference in participation rates were not as pronounced in the SERU sample. In all three samples, Asian students had the highest participation rate. A smaller percentage of first-generation, part-time, and transfer seniors participated in comparison with their traditionally more advantaged peers. Not surprisingly, given the pedagogy and laboratory nature of science, technology, engineering and math (STEM) disciplines, the largest percentage of seniors in both the NSSE and SERU samples majoring in the STEM fields participated in research with faculty. Using SERU 2010 survey data, Douglass and Zhao (2013) also found that a larger percentage of STEM majors participated in research with faculty either for pay or volunteer than non-STEM majors.

SERU survey respondents attend large research universities, which could account for the smaller variation in participation rates within race/ethnicity, first-generation, transfer, and

other student characteristics. NSSE institutions are diverse in missions, resources, and priorities and may or may not facilitate undergraduate research opportunities in the same ways that large research universities do. Future studies are needed that account for differences in institutional type when trying to understand the factors that are associated with HIPs participation.

Internships.

Because of the potential for positively impacting student engagement and learning, the AAC&U has called for campuses to be more intentional about integrating experiential learning (e.g., internships) into the academic curriculum. AAC&U (as cited in Kuh, 2008) considered experiential learning opportunities like internships as a HIP based on the works of Bransford, Brown, and Cocking (1999) and Cross (1999). Further, the Boyer Report (1998), based on the assumption that "learning is based on discovery guided by mentoring rather than on the transmission of information" (p. 15), stressed that undergraduate education at research universities should provide integrating experiences such as undergraduate research and internships.

Kuh (2008) defined the essential components of internships to include "direct experience in a work setting, usually related to [student] career interests, and to give them the benefit of supervision and coaching from professionals in the field" (p. 10). AAC&U (as cited in Kuh, 2008) mapped internships as a HIP that is associated with the following AAC&U's Essential Learning Outcomes: strengthening intellectual and practical skills and

practicing integrative and applied learning. When deciding whether an internship should be considered a HIP, O'Neill (2010) argued that internships had the potential to meet all six of Kuh's (2008) elements of a high-impact practice. Internships help students (1) increase effort, (2) build relationships, (3) engage across differences, (4) receive feedback, (5) apply learnings, and (6) reflect on self-development.

Not only can an internship, when designed according to best practice, provide students with an opportunities. Based on a literature review, Keller (2012) concluded that internships provide the opportunity for students to apply what they have learned in the classroom to a workforce setting, it provides the opportunity for students to network, explore interests, and gain valuable skills that enhance post-collegiate workforce preparation (citing works from Gardner & Motschenbacher, 1997; Gault, Leach, & Duey, 2010; Hurst & Good, 2010; O'Neill, 2010; Zhao & Liden, 2010). The caveat here is that intentional effort is needed to create internship experience if they are to be done well. Keller conducted a phenomenological study of internship participants in order to better understand the key elements that make internships high-impact experiences. She concluded, "The results suggest that when internships are done well, they can embody Kuh's (2008) six elements of high impact practices as they are effortful, include feedback, apply learning, prompt reflection, build relationships, and engage across differences" (p. vi). Keller's study underscored the importance of universally defining high-impact practices and providing evidence that key elements, when present, provide indicators of truly impactful experiences.

Due to the multiple goals of students, employers and colleges, the National Association of Colleges and Employers (2010) released a position statement on internships, which defines a framework for uniformly defining what constitutes a quality internship experience. They defined,

> An internship is a form of experiential learning that integrates knowledge and theory learned in the classroom with practical application and skills development in a professional setting. Internships give students the opportunity to gain valuable applied experience and make connections in professional fields they are considering for career paths; and give employers the opportunity to guide and evaluate talent (NACE, 2010).

NACE also outlined criteria defining quality internships. Obviously, measures of students' self-reported participation in internships does not allow for the inference that internships met standards of best internship practice. Indeed, most studies of the impact of internships on student outcomes have remained at the program or collegiate level, which unfortunately limits inference of impact to the local setting represented by the convenience sample.

Since much of the work on tracking internship participation comes from self-reported survey items, comparing participation rates for underserved and traditionally more

advantaged students between survey samples can be helpful (Kuh, 2008; NSSE, 2012; Lydell & Gorny, 2014). Table 3 describes self-reported internship participation rates between three samples. Kuh's (2008) study used 2000 NSSE data. While Kuh's report does not provide details on the sampling methodology used, one can see from perusing Table 3, that the percentage of students who participated in HIPs was very similar 12 years later, as indicated on NSSE's (2012) Annual Report. Lydell and Gorny's (2014) study indicated that when examining self-reported internship participation rates, students in the 2012 SERU survey sample did not report internship participation at the same rate as students in the NSSE sample. The difference could be largely due to the fact that NSSE sample includes a variety of institutional types (see Table 3), whereas the SERU survey is only administered at doctoral granting institutions with very high research activity.

Table 3.

A Comparison Between Seniors' Internship Participation Rates for NSSE and SERU Survey Samples.

	Kuh 2008 %	*NSSE 2012 %*	*SERU 2012 %*
Institutional Characteristics			
Doc RU-VH	57	54	44
Doc RU-H	51	48	-
DOC DRU	51	37	-
Masters - L	48	49	-
Masters - M	52	49	-
Masters - S	51	54	-
Bac - A&S	66	66	-
Bac - Diverse	60	55	-
Race/Ethnicity			
African American/Black	45	40	48
Asian/Pacific Islander	50	46	39
Caucasian/White	56	51	42
Hispanic	45	41	41
Sex			
Male	-	47	42
Female	-	51	46
Enrollment			
Part-time	38	36	-
Full-time	56	53	-
First-generation			
No	57	55	45
Yes	48	43	41
Transfer			
Started Here	61	59	47
Started Elsewhere	43	39	37
Age			
Under 24	61	60	45
24 and Older	40	35	32
Major Category			
Arts & Humanities	-	46	34
Biological Sciences	-	53	47
Business	-	39	48
Education	-	70	46
Engineering	-	55	45
Physical Sciences	-	48	36
Professional (Other)	-	53	45
Social Sciences	-	48	43

Compared to the NSSE samples, a smaller percentage of SERU survey senior respondents participated in internships with two exceptions; African American and Business majors. Whereas about 10% more White seniors reported participating than African American and Hispanic students in the NSSE samples, African Americans participated at the highest rate within the SERU 2012 sample, with roughly equal participation rates of Asians, Whites, and Hispanic students. First-generation students, transfers and non-traditionally aged students participated at lower rates than their more advantaged peers in all samples. For academic major, internship participation rates were less variable in the SERU than the NSSE samples. Again, this difference could be largely due to the fact that the SERU survey is only administered at research universities, thus resulting in smaller variation in participation rates than the institutionally diverse NSSE universe.

In summary, key elements of what constitutes a quality internship have been documented based on qualitative studies and literature reviews. While not the norm, Parker, Kilgo, Sheets and Pascarella (2016) studied the impact of internships at the macro level. Drawing from the WABASH National Study of Liberal Arts Education cohorts, they found a relationship between internship participation on fourth-year grade point average, after controlling for demographics and institutional characteristics. Unfortunately, effect size estimates were not reported. Given the micro impact of internships on student learning and workforce preparation outcomes, and the macro impact of internship participation on gross indicators of academic performance and job opportunities (Knouse,

Tanner, & Harris, 1999), ensuring that students from underserved backgrounds have access to these opportunities is essential.

Senior thesis/capstones.

Culminating senior thesis opportunities are typically offered during the senior year and provide an opportunity to integrate, synthesize, and apply previous learning in the academic major or general core education into a coherent whole (Kuh, 2008). The project is typically in the form of a research paper, performance, portfolio of "best work", or an exhibit. AAC&U (as cited in Kuh, 2008) considered capstones as a HIP based on Pascarella and Terenzini's (1991) report that "[intellectual development] is stimulated by academic experiences that purposefully provide for . . . integration" (p. 609). AAC&U mapped capstones/senior theses as a HIP that is associated with the following AAC&U's Essential Learning Outcomes: fostering broad knowledge of human culture and the natural world and practicing integrative and applied learning. After conducting an extensive review of HIPs literature, Brownell and Swaner (2010) reported that research on senior capstone experience was scant.

The Boyer Commission Report (1998), which recommended evidence-based practices to reform undergraduate education at research universities, stated that capstone experiences should be included as a regular part of the undergraduate experience. Capstones should ideally happen in the senior year and encompass "all the skills of research developed in earlier work should be marshaled in a project that demands the framing of a significant

question or set of questions, the research or creative exploration to find answers, and the communication skills to convey the results to audiences both expert and uninitiated in the subject matter" (p. 27).

In their review of the literature published between 1999 and 2010, Riehle and Weiner (2011) found that while the goals of capstone experiences differed by major, enhancing information literacy was a common theme. Capstones from the disciplinary fields of social sciences, STEM, communications and health care required a review of the literature and some degree of synthesis and evaluation of research within the disciplinary field. In their review, Reihle & Weiner cited literature regarding capstones from various scholars (Brooks, Benton-Kupper & Slayton, 2004; McGoldrick, 2008; Ostheimer & White, 2005; Narasimhan, 2009; Ford, Bracken, Wilson, 2009; Epstein, 2007; Matos & Grasser, 2007; Roscoe & Strapp, 2009; Oh, Kim, García & Krilowicz, 2005).

Since senior theses/capstones are considered HIPs, it stands to reason that students from traditionally underserved backgrounds should have equal access to participation. As is the case with tracking participation in undergraduate research and internship participation rates, much of the work on tracking senior theses/capstone participation comes from self-reported survey items. Table 4. compares participation rates for traditionally underserved and more advantaged students between survey samples (Kuh, 2008; NSSE, 2012; Lydell & Gorny, 2014).

Table 4.

A Comparison Between Senior Thesis/capstone Participation Rates for NSSE and SERU Survey Samples.

	Kuh 2008 %	*NSSE 2012 %*	*SERU 2012 %*
Institutional Characteristics			
Doc RU-VH	29	31	25
Doc RU-H	33	31	-
DOC DRU	33	28	-
Masters - L	30	33	-
Masters - M	30	33	-
Masters - S	36	38	-
Bac - A&S	55	59	-
Bac - Diverse	37	38	-
Ethnicity			
African American/Black	27	38	36
Asian/Pacific Islander	28	42	22
Caucasian/White	34	47	31
Hispanic	26	36	20
Enrollment			
Part-time	22	23	-
Full-time	35	36	-
First-generation			
No	36	38	26
Yes	29	28	23
Transfer			
Started Here	38	40	26
Started Elsewhere	25	25	24
Age			
Under 24	37	41	25
24 and Older	24	23	28
Major Category			
Arts & Humanities	-	39	37
Biological Sciences	-	35	14
Business	-	32	24
Education	-	26	20
Engineering	-	46	35
Physical Sciences	-	34	20
Professional (Other)	-	23	23
Social Sciences	-	37	23

The participation rate in senior theses/capstones in the SERU sample was lower than the NSSE samples for all seniors except for those who were 24 years or older. Again, the unique experience of students at research universities could account for the differences. African American and White students participated in higher rates than Asian and Hispanic students for the SERU sample. First-generation and part-time students' participation rates were lower than their more advantaged peers for NSSE and SERU samples, however, the difference was more pronounced in the NSSE samples. The largest percentages of NSSE and SERU survey respondents reporting participation were in the disciplinary fields of Engineering and Arts & Humanities.

Ethnicity and Parental Education

Race/ethnicity and parental education have been shown to be related to HIPS participation in activities such as research with faculty, internships, and senior theses/capstones (Kuh, 2009; Finley, 2011; Finley & McNair, 2013; Lydell & Gorny, 2015b). As mentioned previously in this dissertation, the results of studies comparing HIPs participation rates between students of different racial/ethnic backgrounds have been mixed. On the one hand, Finley (2011) found that Black students participated at lower rates in research with faculty, internships, and senior theses/capstones than students from other racial/ethnic groups. On the other hand, she found that Hispanic students participated at the highest in the three HIPs. Finley and McNair (2013) found that Hispanic and Asian students participated in less HIPs, on average, than White students. There was not a significant difference between participation between White and Black students. Finley (2011) found that participation rates "do not vary dramatically across

racial categories…or at least not in ways that might be expected" (p. 3), at least for first-year students, concluding that "it is instructive to examine the emergent differences in participation by race when moving from first-year to senior students"(p. 4).

In their analysis of data from 362,000 students attending 564 U.S. baccalaureate degree awarding institutions, NSSE (2010) found that "students of color were less likely to have held an internship or field placement compared to their white peers" and "African Americans were half as likely as their white peers to have studied abroad, and Latino students were one-third less likely to have done so" (p. 9). The mixed findings of the association between students' race/ethnicity and HIPs participation rates could be attributed to the fact that all studies, with the exception of Lydell and Gorny (2015b), were conducted using NSSE data, which is a convenience sample consisting of a diverse group of institutional types. Medium and larger master's degree-granting and baccalaureate-degree arts and sciences were over-represented, relative to the population of U.S. four-year colleges and universities in the sample, and research universities engaged in very high research activity were underrepresented (NSSE, 2016). Focusing on one institutional type, rather than a conglomerate, may yield very different results.

One consistent finding across studies was that first-generation students participated at lower rates (Kuh, 2008; Lydell & Gorny, 2015b; Finley, 2011), and in a lower number, on average, in HIPs (Finley & McNair, 2013). According to the Pell Institute for the Study of Opportunity in Higher Education, over the past fifteen years, enrollment in post-

secondary institutions has increased markedly, reaching a crescendo during the recession of 2007-2009 and aftermath (Cahalan et. al., 2016). While there have been slight dips in enrollment numbers since 2012, enrollment numbers are at an all point high. The Pell Institute was mainly concerned with longitudinally assessing progress on equity benchmarks, including post-secondary enrollment and attainment, of students who have been traditionally at a disadvantage in terms of race/ethnicity, family income, and parental education. Some of the equity indicators of educational opportunity put forth included who attends colleges, where they attend, how they pay, and how Bachelor's degree attainment varies by student background characteristics, like race/ethnicity and parental education.

Using the Current Population Survey (CPS) data, the Pell Institute (Cahalan et. al, 2016) found that while gaps across racial/ethnic groups have narrowed between1976-2014, distinct patterns of inequity still exist. In 2014, of high school students who either graduated or dropped out, the largest percentage of Asian (83%) students continued on to any type of post-secondary education, followed by White (59%), Black (58%), and Hispanic (49%) students. The estimates of continuation from high school to college by race/ethnicity vary by the data source. For instance, the ELS 2002 survey measured college attendance rates by ethnicity ten years later in 2012 and found larger disparities than were found in the CPS survey. The largest percentage of continuers were Asian (93%), followed by White (87%), Black (82%), Hispanic (79%) and American Indian/Alaska Native (77%) students. College continuation gaps are narrowing and a

larger percentage of students from diverse racial/ethnic groups are pursuing post-secondary education. It imperative that as institutions of higher education are matriculating students of color, they must provide and promote opportunities for engagement and growth, like participation in HIPs, to ensure that students of color are engaged while in college, as well as persist and graduate with the skills to compete in the workforce.

Padgett, Johnson, and Pascarella, (2012) categorized studies querying the influence of parental education on positive student outcomes into three categories: college access (citing Bui, 2002, 2005; Ceja, 2006; Gibbons & Shoffner, 2004), academic achievement (citing Chen & Carroll, 2005; Dennis, Phinney, & Ivey-Chuateco, 2005; Ting, 2003), persistence retention (citing Duggan, 2001; Harrell & Forney, 2003; Ishitani, 2006; Martin Lohfink & Paulsen, 2005; Rendon, 1995; Somers, Woodhouse, & Cofer, 2004; Warburton & Carroll, 2001), and learning outcomes (citing Terenzini, Springer, Yaeger, Pascarella, & Nora, 1996). Padgett, Johnson, and Pascarella, (2012) provided a micro-level analysis in terms of looking at what first-year students do while they're enrolled college, and institutional focus on providing good practice (based on Chickering and Gamsons's, 1987 article *Seven Principles of Good Practice in Undergraduate Education*). Based on their analysis of pre- and post-test measures of first-year undergraduate students from a nationally representational sample of colleges and universities, they found that good practice (academic challenge, diversity experiences, interactions with peers, positive faculty interactions) differentially impacts first- and non-

first-generation college students' cognitive and psychosocial development. Specifically, first-generation students benefitted more from frequent interactions with peers, an academically challenging environment, and diversity experiences than did non-first-generation students.

Parental educational attainment has not only been shown to influence college students' decision-making, including whether or not to attend college and what college to attend, it has also been shown to influence HIPS participation (Finley McNair, 2013; Finley, 2011; Lydell & Gorny, 2015b). Students with parents that earned a Bachelor's degree or higher were more likely to participate in HIPS than those whose parents did not, even after controlling for other background characteristics, such as race/ethnicity and sex. Lydell and Gorny (2015b) found that the odds of non-first-generation students participating in internships and research with faculty were about 20% higher than first-generation students, and almost 70% higher for (participating in study abroad (after controlling for race/ethnicity, sex, and self-reported income). These findings underscore the importance of considering parental educational attainment when evaluating equitable participation in HIPs.

Students' Financial Circumstances

Students' financial background and circumstances have been found to affect student decision-making regarding collegiate choice, enrollment, persistence, and degree attainment. Hu (2010) pointed out that many studies have linked student engagement and subsequent positive outcomes in higher education (Astin, 1993; Pascarella & Terenzini,

2005), underscoring the importance of conducting research on the antecedents of student engagement in educationally purposeful activities (Hu & Kuh, 2002), such as student background and institutional characteristics. Hu (2010) cited research that promoted college access and success (Heller, 1997; Leslie & Brinkman, 1988; St. John, 2003), and specifically, the impact of financial aid (Cabrera, Nora, Castanada, 1992; St. John, 2003; St. John, Asker, & Hu, 2000). Hu pointed out the lack of research on students' participation in activities, and the impact of student financial aid on decisions regarding what activities they became involved in during college. Hu found that high-achieving, low-income scholarship recipients, compared with non-scholarship recipients, were more likely to attend four-year, private institutions than two-year institutions, hence, positively impacting students' engagement in the social and academic life of the institution.

Most studies regarding the influence of students' financial circumstances focus on the role that financial aid plays in collegiate access and success, as measured by enrollment, persistence, performance, and graduation. Limiting the study of the impact of financial aid to macro level analysis fails to account for how financial aid, or improved financial circumstances through financial aid, impact what students do, or how engaged they are while in college. Indeed, Hornak, Farell, and Jackson (2010) found that student finances impacted low-income students' involvement and experiences during their first year. In summary, while we know that financial circumstances impact retention and graduation decision-making, we do not know how they impact students' decisions to participate in HIPS.

Household income.

The percentage of students qualifying for income-driven free- and reduced-lunch, as well as those eligible for financially need-based federal grants has sharply increased since the mid-2000s, suggesting a sizable increase in the share of low-income students in college (Cahalan et. al., 2016). While free- and reduced lunch eligibility may not be the most valid indicator of household income (Harwell & LeBeau, 2010), it has been used in studies where socioeconomic status indicators are scant. Based on the Current Population Survey, the Pell Institute (Cahalan et.al., 2016) reported income by quartiles, as quartiles facilitated the ease of measuring change over time and measure points on a distribution. They concluded, "In 2014, the maximum income for the lowest quartile was less than one-third (29 percent) that of the minimum income level of the top quartile. Reflecting growing inequality of income in the United States, the difference between the top and bottom family income quartiles has increased since 1970" (p. 19).

According to the Pell Institute, while college enrollment gaps are widening between higher- and lower-income students, a larger percentage of students from low-income backgrounds are pursuing post-secondary education compared to 1970 (Cahalan et. al.,, 2016, p. 20). Further, student loan indebtedness is at a peak, especially so for students who received Federal need-based grants. As institutions of higher education are matriculating low-income students, they must provide and promote opportunities for engagement and growth, like participation in HIPs, to ensure that low-income students persist and graduate with the skills to compete in the workforce.

The diversity in the ways that scholars have used parental income indicators is striking. As Walpole (2007) pointed out, categorizing income brackets, either based on quartiles or other ranges, was a popular method (Perna, 2005; DesJardins, Ahlburg, & McCall, 2006), and some have even mapped income brackets to low-, middle- and high-income (Paulsen & St. John, 2002; Akerheim et al., 1998; Teranishi, et al., 2004). Further, while many scholars have used household income as a standalone variable, others have included it as part of an SES composite. The validity evidence surrounding the use of SES indicators will be discussed later in this dissertation.

Social class.

Measuring social class has not proven to be an easy task. Walpole (2007) pointed out that scholars have used one or more of the following indicators to represent social class; parental education (Goyette & Mullen, 2006; Dennis, Phinney, & Chuateco, 2005), parental occupational status (Slaley & Brown, 1983), and parental income. Walpole continued that some studies have used all three (Terenzini, 2001), while other have used first-generation college student status as an indicator of social class.

More robust measures of SES have been used in the National Center for Educational Statistics (NCES) longitudinal survey efforts, including the Beginning Post-Secondary (BPS), National Longitudinal Survey of Youth (NLSY), National Education Longitudinal Survey (NELS) and High School and Beyond (HS&B) have added various measures to

the study of SES, including cultural resources (magazine subscriptions, books, library card) and household possessions. While most scholars would agree that SES should be represented as a composite, not all researchers have access to a robust set of indicators. The Pell Institute (Cahalan et. al., 2016) measured social class based on data from NCES parent and student questionnaire. A composite was created including family income and parents' level of education and occupational prestige score. Across three NCES-sponsored high school longitudinal studies that used the same composite of SES found that almost half of the students in the lowest quartile did not report attending college ten years out of high school (NELS:1988/2000; HS&B:1980/1990), but the percentage of low-income non-enrollers was 28% in the ELS:2002/2012 study. The Pell Institute also concluded, "As institutional selectivity increases, the share of students who come from the bottom SES quartiles declines substantially and this pattern shows a consistency over the period [1972-2004 high school class cohorts]" (p. 33). In summary, students from low SES backgrounds do not attend college at the same rate as higher SES students, and they tend to be overrepresented in two-year and less competitive four-year institutions (p. 35).

In fact, the Pell Institute (Cahalan et. al., 2016) identified high inequality and persistent gaps in each collegiate level of selectivity, based on Barron's Admissions Competitiveness Index. Given the fact that the cost of attending college is typically higher at more selective institutions and four-year colleges, it is not surprising that the lower SES students attend less selective institutions, as the percent of their total family income needed to meet college expenses is much higher for lower SES students than it is

for higher SES students. For household incomes less than $50,000, the percentage of income that would meet the cost of attendance varies from over half, and in the lowest income brackets ($10,000-$20,000 or $20,000 or less), with the cost of attendance equaling 162% and 238% of their total family income, respectively. Unfortunately, the Pell Institute (Cahalan et. al., 2016) only focused on equity indicators of college student access based on public/private control and the level of selectivity of institutions. They did not specifically address whether students from lower SES brackets were attending large, research intensive universities at different rates than other institutional types.

Fortunately, one can use enrollment data provided by member institutions from the Association of American Universities (AAU) to serve as a gauge for enrollment patterns from students from lower SES backgrounds attending research universities. The AAU Membership Policy (n.d.) indicated that member institutions are composed of "leading comprehensive research universities distinguished by the breadth and quality of their programs of research and graduate education…membership in the association is by invitation….with the goal of ensuring that the association in fact comprises comparable leading research-intensive universities" (p. 1). Indeed, as a means to create comparable peer groups, only AAU-member research universities are eligible to administer the Student Experiences in the Research Universities (SERU) survey, which is the primary source of data for this present study. While information on low-income/SES students is scant, the AAU reported that the percentage of Pell-eligible undergraduates attending AAU institutions increased from 17.9% in 2007-2008 to 23.4% in 2012-2013. Given the

fact that research-intensive universities are serving more low-income students, understanding how students from different financial backgrounds participate in HIPs while attending these relatively homogenous group of research universities, is important.

Academic Discipline.

It may seem like common sense that students majoring in certain disciplinary fields may participate in HIPs at higher rates than peers in other disciplinary fields. Based on their analysis of an institutionally-diverse sample of 362,000 survey respondents across 564 baccalaureate-degree granting institutions, NSSE (2010) found that student participation in HIPs was influenced by academic discipline. While the study explored NSSE engagement items and participation in HIPs for Biology, Psychology, Business, and English majors, they did plot HIPs participation rates for other majors. More than 50% of majors participated in research with faculty in the following fields: Biochemistry or Biophysics, Chemistry, and Physics. Obviously, these fields use lab-based inquiry, which may account for the large participation rates. Some disciplinary majors involved students in internships, with the largest participation rates being observed in journalism, teaching-related fields, and nursing. Almost half of the students participating in senior capstones majored in political science and history, compared to a 33% participation rate overall.

Research suggests that academic discipline is associated with the type of HIPS that students participate in (Reihl & Weiner, 2013; Douglass & Zhao, 2013) and self-reported student learning outcomes (Thompson & Douglass, 2009). For instance, students training to be teachers may be required to participate in an experiential learning experience, like

student teaching, and some students may even self-report this experience as participating in an internship when responding to student surveys. NSSE (2010) found that students majoring in teaching professions did, indeed, report higher rates of internship participation than students majoring in other disciplines. Indeed, Sharp, Komives and Finscher (2011) emphasized the importance of including co-curricular experiences linked with majors, such as internships, as a potential for developing outcomes beyond those achieved as traditional degree requirements, highlighting the potential for collaboration between student affairs professional and faculty and an area ripe for student outcomes research.

In their book *Academic Disciplines: Holland's Theory and the College Students and Faculty* (2000), Smart, Feldman, and Ethington drew upon Holland's (1966, 1973, 1985, 1997) widely cited theory of careers as the foundation theoretical framework to better understand "how academic disciplines influence the professional lives of faculty and the educational lives of students" (p. ix). They found that

> College students search for and select academic environments compatible with their personality type (self-selection assumption); academic environments-distinctive clusters of academic disciplines-reinforce and reward students for their display of different competencies (socialization assumption); and students flourish in academic environments congruent with their personality types (congruence assumptions) (p. x).

Holland's (1997) theory mapped disciplinary environments to personality types, including investigative, realistic, artistic, enterprising, social, and conventional (as cited in Feldman, Smart, & Ethington, 1999). Research along these veins is plenty, and summary of such is outside the scope of the paper. However, it should be noted that Holland emphasized that one component of socialization into the disciplinary field of study is done through disciplinary environments that select for certain preferred activities. Feldman, Smart, and Ethington (1999) further extrapolated Holland's theory by adding that the academic environment acts to influence students by the kinds of activities they encourage students to become engaged in, the types of competencies they seek to develop in students, the kinds of self-concepts they attempt to promote in their students, and the types of interests, values, and competencies they most commonly reward.

Smart, Feldman, and Ethington (2000) posit that faculty in various academic environments will emphasize certain undergraduate goals over others. It stands to reason that the degree of emphasis placed on offering HIPs activities, as well as promoting and rewarding student participation in such activities, would vary based on disciplinary values and norms.

Validity of Financial Indicators

Self-reported data has been criticized, especially when items are sensitive in nature, difficult to answer, or are generally prone to elicit biased responses (Tourangeau, Rips, & Rasinski, 2000; Howard, 1980; Howard & Dailey, 1979; Bowman & Hill, 2011; Bowman

& Herzog, 2011; Campbell & Cabrera, 2011; Herzog, 2011; Herzog & Bowman, 2011; Porter, 2011; Porter, Rumann, Pontius, 2011; Seifert & Asel, 2011). Over the last decade, entire peer-reviewed journal issues have been devoted to the topic of the reliability and validity evidence for student engagement surveys in terms of measuring what students say they do in college and educational outcomes: (1) *New Directions for Institutional Research*, Summer 2011 and (2) *The Review of Higher Education*, Fall 2011. In his introductory chapter to the *Review of Higher Education* special issue, Olivas (2011) stated that while criticisms have been based on the Indiana University's Center for Postsecondary Research, which is the home of many student engagement surveys (SSEs), including the popular and widely used National Survey of Student Engagement (NSSE), the same critiques would be applicable to other SSEs.

While summarizing critiques regarding reliability and validity evidence of student engagement surveys are outside of the scope of this dissertation, one point should be made. Validity is evidence-based (Messick, 1995). Undergirding their NSSE critique, Dowd, Sawatzky, and Korn (2011) summed up the meaning of validity by citing the Standards of Educational and Psychological Testing (1999). They stated,

> The current meaning of validity is based on a unified construct of validity that emphasizes the use of 'validity evidence' for reaching valid inferences. There are five interrelated types of validity evidence: (a) evidence based on survey or test content, (b) evidence based on response processes, (c) evidence based on the

> internal structure of the survey or test items, (d) evidence based on the relationship of data obtained using the instrument to similar measures, and (e) evidence based on the consequences of using survey or test results for decision making. Validity itself is defined as 'the degree to which all of the accumulated evidence supports the intended interpretation of the test scores for the intended purposes' (Standards, p. 11). A survey or test is not said to be valid or invalid. The inferences made by interpreting the data obtained by using an instrument are said to be valid or invalid. Thus, the construct representation and content of any survey are critical starting points for assuring validity (Dowd et al., 2011, p. 23).

Generally speaking, the present study uses student engagement survey responses to operationalize constructs of student background characteristics, or as Astin (1993) would describe as inputs, and broadly, students' participation in HIPs. Specifically, this study uses students' responses to SSE items regarding their household income and socio-economic status when growing up to represent their financial circumstances.

Obviously, these two indicators of financial circumstances are flawed in terms of construct underrepresentation. There are many aspects to financial circumstances that are not covered by the typical SSE, or student surveys in general. Nonetheless, studies of the impact of financial circumstances on higher education access based on student surveys in general are common (as summarized by Walpol, 2007). Quoting Cronbach (1971, p. 447), Pedhazer and Schmelkin (1991) summarized, "One validates, not a test, but an

interpretation of data arising from a specific procedure" (p. 31). Interpretation of students' self-reports of household income and socioeconomic status while completing student engagement surveys should ideally be based on validity evidence. While Pedhazer and Schmelkin (1991) highlighted scholarly disagreement over a validity evidence typology, they noted the predominate use of content (domain), criterion (outcomes), and construct (trait or attribute) validity. They added, "we believe that a classification of the validation process according to major purposes is convenient, provided the classification is not reified and provided one does not lose sight of the fact that the different purposes are interrelated facets of the same process (p. 32).

Socioeconomic status can arguable be conceived as a construct, made up of an infinite combination of facets that together define the construct. The construct of socioeconomic status is not universally well-defined (Walpol, 2007; Soria, 2013; Harwell and LeBeau, 2010), however, certain definitions have been proposed in educational outcomes studies. NCES (2012) defined SES as

> One's access to financial, social, cultural, and human capital resources. Traditionally a student's SES has included, as components, parental educational attainment, parental occupational status, and household or family income, with appropriate adjustment for household or family composition. An expanded SES measure could include measures of additional household, neighborhood, and school resources (p. 4).

NCES noted that the definition was derived by creating consensus among an expert panel involved in the National Assessment of Educational Outcomes program. Indeed, citing that the indicator of eligibility for free- or reduced-lunch was becoming less valid over time (Harwell & Lebeau, 2010), the National Assessment Governing Board (NAGB, 2013) requested that NCES form a panel to help better define the construct, as well as SES components and correlates, and make recommendations for data collection and measurement approaches. The Panel (NCES, 2012), concluded that SES was made up of three primary components: parental educational attainment, family income, and parental occupational status. They posed concerns over the validity of these traditional measures, concluding, "Although the proxy variables currently used in NAEP reflect these factors to some extent, questions have been raised about the quality of the data, the narrowness of the measure, and the lack of a composite SES measure" (p. 7). Based on their review, they suggested that other indicators should be used as well, including home possessions and resources, as well as neighborhood and attendant school, to help create a more refined measurement. Citing issues with relying upon students' self-reports of SES indicators, they suggested merging survey data with census data.

In order to feel more confident about students' self-reporting on indicators used to represent the construct of SES, NCES concluded that

> Cognitive laboratory studies must be conducted on various question types for collecting student reports on parental occupation. If questions could be developed to provide reliable information on parental occupation, then it would be useful to use these data in creating a better measure of SES, even if such information does not reach the same reliability and validity level as other questionnaire responses (p. 20).

The recommendations also included comparing parent and student responses to SES items between different questionnaires, as well as comparing parent responses with student responses. One limitation to the recommended approaches to establish validity evidence of self-reported data is the over-reliance on the survey, or questionnaire method, in and of itself. Campbell and Fiske (1959) noted, "Validation is typically convergent, a confirmation by independent measurement procedures….Independence of methods is a common denominator among the major types of validity" (p. 81). Pedhazur and Schmelkin (1991) provided an illustrative example, "different methods of measurement of specific traits in a specific setting may be affected by halo, social desirability, and the like, thereby making the methods less different from each other than they appear to be" (p. 77). Based on this line of reasoning, one could conclude that collecting SES information via self-reported questionnaires may result in highly correlated data that is more reflective of the data collection method than of a true correlation.

In addition to possible methods effects that impact the correlations between SES indicators that result in erroneous inferences based on the observed inter-relatedness of SES measurements, Pedhazur and Schmelkin (1991) also warned of possible respondent effects including self-preservation by summarizing Sudman and Bradburn (1974), "it is generally assumed that, other things being equal, people will act in ways that reduce personal and social discomfort or to make as good an impression on other people as possible" (p. 9). While the condition of confidentiality is typically stressed, students responding to surveys may be inclined, in self-preservation, to misrepresent income and SES background.

Typically, studying the validity of college students' self-reported financial data would constitute the collection of FERPA-protected sensitive data and would require an extensive income documentation collection and review, which is not feasible for most research studies. That leaves researchers in an unfortunate situation. Proxies of financial data have been used in social studies research, including eligibility for free- or reduced-priced lunches in the K-12 arena (Harwell & LeBeau, 2010; NCES, 2012) and Pell eligibility, which is calculated for students who completed Free Application for Student Aid (FAFSA).

The vast majority of students are required to take the FAFSA to apply for financial aid or qualify for scholarships and merit-based institutional aid. Unfortunately, student-level financial aid data is hard to secure for research purposes and subject to stringent FERPA

rules. FAFSA data is often verified by financial aid officers to ensure correct FAFSA data entry by requiring parents and students to provide income tax returns and other documented income sources as a follow-up to their self-reported FAFSA data. In fact, this mandatory validity checking of household income through the FAFSA process helps to ensure that financial aid data should be fairly accurate.

Self-reported social class has been criticized as being a poor indicator of true social class. In her review of the literature regarding social measures in educational research, Soria (2013) emphasized the importance of acknowledging the nuanced complexity involved in understanding social class. Based on review of the literature, Soria concluded (a) social class is hard to define and rarely uniformly defined in research (Walpole, 2007), (b) class identity is mutable and inconsistent across contexts (Barret, 2011), and (c) researchers loosely use the terms social class and socioeconomic status (Ensingmer & Fothergill, 2003). Despite the lack of consistency in definitions and cultural identity, using self-reported student survey measures of social class, Soria (2013) hypothesized a theoretical model tested through structural equation modeling that proposed that students from lower/working-class backgrounds were less involved on campus, perceived less of a sense of belonging, had less interactions with faculty, and perceived the campus environment as less supportive and friendly than middle-upper-middle class peers. Soria used three common measures of social class, including students' self-reported social class when growing up, parental educational attainment, and parental income. Among other relationships evaluated with structural equation modeling, she found that the strongest

direct and indirect effects were observed between students' social class and their involvement on campus (β=0.174) and on their sense of belonging (β=0.150). The point here is that while it may be difficult to measure social class, this is one example of many where self-reported social class indicators were useful in detecting relationships between student background and important dimensions of student involvement.

Chapter Three: Methods

Phase I and II of Study

This study was conducted in two phases. Phase I concerned examining construct validity evidence of the two primary indicators in this study that represent financial circumstances: self-reported parental household income and social class. Phase II focused on directly answering the research questions set out in this study, specifically, how do students' financial circumstances and disciplinary field of study impact their participation in high-impact practices, above and beyond student characteristics that are typically included in HIPs equity studies (race/ethnicity, sex, and parental educational attainment). Phase one preceded phase two because self-reports of household income and social class have been considered dubious in the literature (NCES, 2012; Tourangeau, Rips, & Rasinski, 2000). Since the influence of financial circumstances are of primary interest in this study, empirically examining construct validity evidence of these measures is warranted.

The Methods section begins with an overview of the SERU survey instrument. Since this study was conducted in two phases, phase one methods are discussed separately from phase two methods. Within each phase, the problem statement, data collection strategies, research hypotheses, measures, and analytical techniques are discussed separately.

SERU Survey Instrument

Financial circumstances have been found to affect student decision-making regarding collegiate choice, enrollment, persistence, and degree attainment (Cabrero, Nora, &

Castañada, 1992; DesJardins, Ahlberg, & McCall, 2006; Heller, 1997; Hornak, Farrell, & Jackson, 2010). It stands to reason that they would also impact students' decisions regarding what they do while in college (Hu, 2010). While we know that financial circumstances impact decision-making, we do not know how they impact students' decisions to participate in high-impact practices (HIPs). The SERU survey collects information on student participation in HIPs, including research with faculty, internships, and capstone/thesis experiences. It also collects additional indicators of interest in this study (race/ethnicity, sex, parental educational attainment, and disciplinary field of study).

The SERU survey was chosen for this study because it is very similar in content to the National Survey of Student Engagement (NSSE) survey, especially for items gauging HIPs participation. The majority of HIPs equity studies based on the LEAP initiative drew from NSSE survey data (Kuh, 2008; Finley, 2011; Finley and McNair, 2013). Since the items are arguably similar in content in the domains of interest in this study, findings based on this research study should be comparable with past NSSE-based equity research. Unlike NSSE, the SERU survey includes items designed to gauge students' financial circumstances, including SERU household income bracket and social class. The inclusion of financial indicators in HIPs equity research is not commonly found in the literature, as data is not routinely collected from students and is difficult to retrieve from institutional records due to data protections afforded by the Family Educational Rights and Privacy Act (FERPA) regulations.

The SERU survey originated out of University of California (UC) system. Originally known as the UC Undergraduate Experience Survey (UCUES), it was initially administered as a census survey to participating UC schools. In 2009, the survey was available to non-UC-system institutions if they were members of the American Association of Universities (AAU). Membership in the AAU requires that institutions "are on the leading edge of innovation, scholarship, and solutions that contribute to the nation's economy, security, and well-being" (AAU, n.d.). The survey's roots stemmed from the UC Office of the President's desire to learn about the student experience at UC schools and augmented the research agendas of researchers affiliated with UC-Berkeley's Center for the Study of Higher Education (CSHE). The SERU survey has grown to include a Consortium of 23 research universities that desired an instrument that tapped into the student experience in the research university, and within their academic major.

Currently, the survey is housed at CSHE and is jointly administered by the University of Minnesota's Office of Institutional Research and Office of Measurement Services. According to CSHE (n.d.), the purpose of the SERU survey, in its current form, is to (1) gather rich data on student characteristics, including familial, academic, cultural, and ethnic background as well as their self-identity, (2) explore students' expectations, attitudes, and behaviors on campus and within the disciplinary major, and (3) inform decision-making and policies designed to enhance the undergraduate experience. The SERU survey, it its current form, is broken up into four modules: (1) the core, (2) academic engagement and global experiences, (3) civic and community engagement, (4)

student life and development, and (5) technology. All students are presented with the core modules, which contains demographic items, including income, social class, and parental education.

Item development history for the SERU survey has not been extensively documented, nor have the items been scrutinized for evidence of reliability and validity across administrations. Unlike high-stakes testing, the information gleaned from the SERU survey mainly serves administrative purposes, as the primary audience has traditionally been administrators, with the exception of some SERU-affiliated researchers that were not only involved in designing SERU survey items, but also in publishing papers about the student experience (Douglass & Zhao, 2013; Thomson & Douglass, 2009; Soria, 2013). Based on my unpublished review of SERU-related documentation, items loosely followed Astin's (1993) *What Matters in College: Four Years Revisited*, especially in the general content area of **I**nputs (or background characteristics), **E**nvironment (the student experience in college), and **O**utcomes. Astin's theory undergirds the analysis and framework for this study. Additionally, psychometric studies were conducted on items that were collaboratively chosen by key stakeholders to represent constructs of interest to SERU content experts and administrators. Exploratory factor analysis was conducted to ensure that items loaded in similar ways across 2008-2015 SERU survey administrations as evidence of reliability (Chatman, 2009; Chatman 2011). A team of content experts was formed to evaluate the EFA results and make item recommendations. Unfortunately, the items of interest in this study were not included as part of the psychometric studies.

Phase I: Financial Circumstances and Validity Evidence

The findings of all studies hinge on the validity and reliability of the measures used (Pedhazur & Schmelkin, 1991). Self-reported survey data has been criticized, especially when items are sensitive in nature, difficult to answer, or are generally prone to elicit biased responses (Tourangeau, Rips, & Rasinski, 2000). Typically, studying the validity of self-reported financial data constitutes the collection of sensitive data and would require an extensive income documentation collection and review, which is not feasible for most research studies. That leaves researchers in an unfortunate situation. Proxies of financial data have been used in social studies research, including eligibility for free- or reduced-priced lunches in the K-12 arena (NCES, 2012) and Pell eligibility, which is calculated for students who completed Free Application for Federal Student Aid (FAFSA).

Findings from studies have been mixed in regards to the validity of self-reported social class. While concluding that self-reported social class was a viable measure in understanding students' social integration in college, Soria provided a detailed critique of using self-reported measures, citing works from Barratt (2011), Walpole (2007), and Mantsios (2004). According to Walpole's (2007) review of the higher education literature, social class is not a well-defined or a well-agreed-upon construct in research communities, especially across disciplines. Secondly, there is evidence that students define social class in unique ways and may also have a tendency for report bias. Indeed, many students avoid the extreme edges of social class, such as low-income/poor or

wealthy, and tend to identify themselves as middle class. Nonetheless, social class, as a construct, may impact students' identity and HIPs participation decisions.

Fortunately, for this study, the FAFSA parental household income data was available for verifying students' financial self-reports of parental household income and social class on the 2010 SERU survey for one university (hereafter referred to as University X). Through Phase I., this study is making an intentional effort to consider construct validity evidence of students' financial circumstance indicators that will be used to answer the study's primary research questions: examining the impact of financial circumstances on HIPs participation. Providing information regarding the plausibility of using students' self-reports of the two primary indicators of this study may enhance or detract from the credibility of primary Phase II research findings.

First, this section described the SERU 2010 sample. Second, the operational definition of parental household income is explored. Third, the operational definition of social class is described.

SERU 2010 survey and single institution sample.

The SERU 2010 census survey respondents participated in the spring semester of 2010. All degree-seeking, undergraduate University X students were invited to participate in the web-based survey administered at a large, research university in the Midwest. The overall response rate for this survey was 32%. Demographic breakouts for response rates are

unavailable to the researcher. University X's Institutional Research Office merged the SERU 2010 survey dataset with financial aid data. Specifically, data elements from the FAFSA were appended to the SERU 2010 survey data file, including parental adjusted gross income (P-AGI) and the FAFSA-calculated expected family contribution (EFC). In order to evaluate the validity of students' self-reports of household income and social class, the researcher used this pre-existing University X Institutional Research Office's de-identified dataset. This dataset contained FAFSA elements for the 2010 financial aid award year (which was based on income information from the 2009 tax year).

The vast majority of students at University X are required to take the FAFSA to apply for financial aid or qualify for federal student loans, grants, scholarships and need- or merit-based institutional aid. Further, FAFSA data is often verified by financial aid officers to ensure correct data entry (by comparing submitted parental income tax returns with the self-reported FAFSA data). The federally mandated validity checking of household income, including parental adjusted gross income (P-AGI), through the FAFSA verification process ensures that the financial aid data should be fairly accurate.

The Phase I research study is interested only in financially dependent students, as defined by the FAFSA, which represented 85% of the sample. Unfortunately, due to the limited use requirements of the SERU 2010 data set, the percentage of students who matriculated directly from high school is unknown. We do know that in the 2013 SERU survey multi-institutional file, 70% of the students were considered first-time freshmen by their

institution and 86% were 23 years old or younger. Parents are responsible for the cost of education for financially dependent students, thus their financial information is required on the FAFSA. A student is only considered financially independent if they are at least 24 years of age as of December 31st of the award year or they are married, have dependents, orphaned, or active-duty/veterans.

Students were considered dependent students for this study if they identified themselves as such on the following SERU survey item: "Are you a financially dependent student? Some students have no contact with their parents, and therefore cannot use their tax information for filing the FAFSA. If you consider yourself an independent student, then please answer yes". Approximately 92% of students in the sample who identified themselves as either independent or dependent were considered as such by financial aid definitions, making the case that students are fairly accurate at identifying themselves. About 8% of students indicated that they were financially independent when in fact they were dependent. They will be excluded from self-reported SERU family household income analysis because, due to survey logic, they were not presented the family household income item. Responses for students who identified themselves as dependent, regardless of financial aid dependency status, were used when examining the relationship between self-reported household income and social-class. Data on parental household P-AGI is reported only for students who file a FAFSA and are considered financially dependent (according to FAFSA rules), thus adjusted gross income and expected family

contribution is only available for students who applied for aid during the 2010 award year.

Hypotheses, measures, and analytical techniques.

Parental household income.

If students identified themselves as financially dependent, survey logic was used to present them with the SERU income bracket scale based on parent(s) household income.: "To the best of your knowledge, which category includes your parent(s) household's total annual combined income before taxes in 2009?". There were eleven distinct income bracket ranges to choose from, scaling from "less than $10,000" to "$200,000 or more".

It was hypothesized that there should be a positive association between SERU survey self-reported income and adjusted gross income (P-AGI), as measured by the FAFSA. In other words, as one moves up the SERU income bracket scale, the average P-AGI should also increase. Further, it was hypothesized that there should be a negative association between self-reported income and the FAFSA-calculated expected family contribution (EFC). Plainly, as the self-reported SERU income bracket increases, there should be a decrease in the average EFC within income brackets. Finally, SERU income bracket distributions should be different based on parental educational attainment: first-generation students should be represented in lower-income SERU brackets at a greater frequency than non-first-generation students. These findings would serve as evidence

supporting the assumption of construct validity of the self-reported SERU parental income bracket measure.

The distribution of University X's SERU 2010 financially dependent seniors responses to the income bracket item were plotted (see Table 5). It is apparent from this distributional analysis that the majority of students fell between the middle- to high-income income brackets.

Table 5.

Distribution of University X Responses to SERU 2010 Income Bracket Item

SERU Income Bracket	*%*	*N*
Less than $10,000	3	212
$10,000-$19,999	4	240
$20,000-$34,999	7	469
$35,000-$49,999	10	614
$50,000-$64,999	12	772
$65,000-$79,999	13	853
$80,000-$99,999	14	919
$100,000-$124,999	17	1067
$125,000-$149,999	7	419
$150,000-$199,999	6	389
$200,000 or more	7	463

Validity evidence for the SERU parental income bracket indicator was empirically explored by examining the association between income bracket and

(1) FAFSA's Parental Adjusted Gross Income (P-AGI),

(2) Expected Family Contribution (EFC), and

(3) Self-reported SERU 2010 parental educational attainment (first-generation status).

For each self-reported income bracket, average and median P-AGI were calculated. If the average P-AGI fell within the self-reported income range, as indicated on the SERU survey, then that was considered evidence that students, on average, have some idea of parental household income. In addition to considering descriptive statistics, an One-Way ANOVA with Games-Howell post-hoc test statistics were calculated to compare differences in mean P-AGI between the SERU income level brackets. If each SERU income bracket captures substantial mean differences in P-AGI, it stands to reason that the SERU income categories successfully differentiate, on average, between households with varying levels of household income.

As an additional source of validity information, the average and median EFC was calculated for each SERU income bracket. The familial EFC for dependent students is calculated by the federal student aid program based on information entered into the FAFSA. It is based on parents' available income, contributions from assets, number of

dependents in college, and student income. The details of this calculation can be found at the Federal Student Aid website (ifap.ed.gov). The EFC is used to determine eligibility for state and federal grants, and is also oftentimes used to calculate eligibility for institutional need- and merit-based grants and scholarships. If EFC is a measure of financial circumstances, it should also be statistically related to parental household income. A correlation coefficient was calculated to assess this potential relationship. Finally, a One-way ANOVA was performed with Games-Howell post hoc comparisons to identify statistically significant differences in EFC means within the SERU income brackets.

In the literature, parental educational attainment is also associated with income. Students' were classified as either first- or non-first-generation based on their responses to SERU items inquiring about the mother and/or father's highest level of education. First-generation student status was defined as neither parent receiving a bachelor's degree. This definition is consistent with the FAFSA definition used by the federal government. The proportion of students, based on first-generation status, within and across each income bracket was examined, as well their average and median parental P-AGI, was calculated.

Social class.

The SERU survey asks students, "Which of the following best describes your social class when you were growing up?" Responses include "wealthy", "upper-middle or

professional class", "middle-class", "working-class", and "low-income or poor". The percentage of financially dependent students falling within each social class category was calculated. The majority of financially dependent SERU students identified with the middle-class category (50%, n=3389), followed by upper-middle or professional middle (28.4%, n=1921), working-class (15.9%, n=1075), low-income (3.9%, n=266), and finally, wealthy (1.7%n=114).

Validity evidence for the social class indicator was empirically explored by examining the association between students' ascribed social class when growing up and

(1) Self-reported SERU 2010 income,

(2) FAFSA's Parental Adjusted Gross Income (P-AGI), and

(3) Self-reported SERU 2010 parental educational attainment (first-generation status).

Descriptive statistics were calculated to visually explore the association between social class and SERU household income bracket. It was hypothesized that there should be a positive association between SERU self-reported income brackets and the SERU survey social class measure: as SERU income bracket increases, social class should increase. A Chi Square test statistic was computed based on the observed and expected frequencies within each income bracket and social class cell.

Parents' adjusted gross income was provided in the 2010 financial aid award year dataset. For each self-reported social class category, average P-AGI was calculated. It was hypothesized that as social class increases, the average and median P-AGI would also increase. If the average and median P-AGI increased across the five self-reported social class categories, then there was evidence that social class is descriptively related to household income. The distribution of actual P-AGI was also described within each social class category. A One-way ANOVA was used to assess mean P-AGI differences within each social class level. A significant result would suggest that using SERU social class groupings aided in explaining the variation of household P-AGI and EFC.

It is known that social class is, in part, a function of household educational attainment. It was expected that first-generation students would be mostly represented in the lower-social classes and, conversely, non-first-generation students should be represented in the higher social class levels. Accordingly, social class distributions were plotted for first- and non-first-generation students.

Phase II: Equity Models

Finley and McNair (2013) stated "When evaluating the effects of high-impact practices and targeting related programmatic improvements, it is essential to gather evidence of the degree to which particular groups of students are or are not participating in these practices" (p. 8). Phase II of this research study was designed to gather evidence of who and who does not participate in HIPs, as well as to establish an alternative analytical

technique that focuses specifically on measuring engagement in specific high-impact practices, rather than an average of the number of HIPs engaged in.

Given the need to examine the relationship between student background characteristics and HIPs participation, while limiting the institutional type to research-intensive universities, and to comb out whether it is justified to include students' financial circumstances and disciplinary major when trying to understand equitable HIPs participation, the research questions for this study are as follows:

(1) Do seniors from traditionally underserved ethnic/racial, sex, and first-generation backgrounds have a lower odds of participating relative to their traditionally advantaged peers?

Rationale: This research question is similar to extant equity studies of HIPs participation and includes the same variables of race/ethnicity, first-generation student status, and sex. Analytic Technique: Logistic regression modeling will be used to establish statistical controls for race/ethnicity, sex, and first-generation status, thus limiting our examination to the unique contribution that group membership has on explaining HIPs participation.

(2) Does the inclusion of students' financial circumstances add value to explaining HIPs participation, above and beyond a model containing

traditional equity study indicators of race/ethnicity, sex, and first-generation student status?

Rationale: Evaluating whether financial circumstances impact HIPs participation rates, above and beyond the base model, is important, as students from lower-income and social class backgrounds may also be underserved, and therefore, may not reap the benefits associated with participating in HIPs.

Analytic Technique: Stepwise Logistic regression modeling will be used to establish statistical controls for race/ethnicity, sex, and first-generation status, so that the value of adding parental household income and socioeconomic status indicators in equity studies can be assessed.

(3) Does academic discipline impact HIPs participation, above and beyond traditional equity study indicators and seniors' financial circumstances?

Rationale: It is important to examine the influence of disciplinary field of study when considering who participates in HIPs, as some disciplines may inadvertently create a barrier to participation in research with faculty, internships, and senior thesis capstones.

Analytic Technique: Stepwise Logistic regression modeling will be used to establish statistical controls for race/ethnicity, sex, and first-generation status, parental household income, and socioeconomic status so that the value of adding academic indicators in equity studies can be assessed.

This section describes Phase II hypotheses and analytical techniques, followed by a description of the SERU 2013 sample. After the sample characteristics are presented and the dependent variable, HIPs participation, are described, operational definitions of the independent measures used in this study are provided within the framework of stepwise logistic regression models. The measures include race/ethnicity, sex, parental educational attainment, financial circumstances, and disciplinary field of study.

Hypotheses and analytical process.

Stepwise logistic regression (SPSS 21.0) was used to model participation for each HIP separately, as that analytical strategy has the potential for creating information that is arguably more actionable, as outreach and promotion can be targeted to increase participation rates for each HIP. Instead of modeling each HIP separately, Finely and McNair (2013) counted the number of HIPs that students reported, and then compared mean differences in counts. Their strategy would not allow for the examination of equitable participation within each HIP. Logistic regression is an appropriate analytical technique when the outcome variable, HIPs participation in this case, is dichotomous. By using a logistic regression model, the unique contribution of race/ethnicity and first-generation status can be evaluated, after controlling for all other variables in the model. Building upon Finley and McNair's (2013) study, the base model for Phase II used race/ethnicity and first-generation status, but added sex to the equation. This study examined the impact of adding financial circumstances (step one) and academic

discipline (step two) to the base model to ascertain whether collecting and analyzing additional student data would be useful when examining equity in HIPs participation.

It was hypothesized that White students, who are traditionally advantaged in higher education, would have higher rates of participation in HIPs than Black, Hispanic, Asian, Multiracial and nonresident alien students. Further, it was hypothesized that first-generation students would have lower rates of HIPs participation compared to non-first-generation students. Finally, it was hypothesized that female students would have lower rates of HIPs participation.

Building on Finley and McNair's (2013) study, students' financial circumstances (household income and social class) were added to the equation to help explain HIPs participation. Evaluating whether financial circumstances impact HIPs participation rates, above and beyond the base model, is important, as students from lower-income and social class backgrounds may also be underserved, and therefore, may not reap the benefits associated with participating in HIPs. It was hypothesized that there would be a negative association between income and social class and HIPs participation: students from lower income brackets and lower-income/working-class backgrounds would participate at lower rates than their higher-income and higher social class peers.

Finally, disciplinary norms may exist that influence whether academic majors offer, encourage, or expect (either implicitly or explicitly) that students participate in HIPs.

Thus, it is important to examine the influence of disciplinary field of study when considering who participates. Some disciplines may inadvertently create an institutional barrier to participation in research with faculty, internships, and senior thesis capstones. By considering the influence of disciplinary field of study, above and beyond student characteristics and financial circumstances, provides valuable information that has the potential for creating actionable change within the discipline to enhance students' opportunities to participate in HIPs.

Some of the most popular majors on campus are in the social sciences. Since the majority of students in the sample major in this area, comparing HIPs participation between social science students and other disciplinary fields is warranted. It was hypothesized that students in STEM-related fields (engineering, biological sciences, physical sciences, mathematics, and computer sciences) would participate in research activities with faculty at a higher rate than students in the social sciences. It was also hypothesized that social science students would participate in internships and senior thesis/capstones at a higher rate than non-social science students.

SERU 2013 survey and multi-institutional sample.

Phase II data was drawn from the SERU 2013 multi-institutional file, which contained merged survey and institutional records from 14 universities (see Table 6 for response rates by institution). The survey was administered online during the spring 2013

semester. It was an online census survey sent to all degree-seeking students through their university email account.

Table 6.

Response Rates for SERU 2013 Administration by Institution

Institution	*Invited (n)*	*Responded (n)*	*Response Rate %*
Purdue University	27886	6352	22.8
University of Texas	37886	12080	31.9
University of Florida	30901	19286	62.4
University of Minnesota	28606	10472	36.6
University of Pittsburgh	17132	6622	38.7
Rutgers University	30462	7517	24.7
University of Michigan	26413	6862	26.0
University or Oregon	19631	4252	21.7
University of Southern California	17282	4798	27.8
University of North Carolina	17087	5978	35.0
University of Virginia	14269	5002	35.1
Texas A&M University	39146	7219	18.4
University of Iowa	19848	5929	29.9
Indiana University	30150	6696	22.2
Total	356699	109065	30.6

As you can see in the Table 6, exceptional response rates were reported for the University of Florida. Unfortunately, due to SERU Consortium data use requirements, Phase II research analysis could not control for the influence of over- or under-representation of students from certain universities, as institutions, as well as survey respondents, have been de-identified in the dataset to preserve anonymity.

Demographic response rates were only available for the University of Minnesota. Spring 2013 University of Minnesota enrollment statistics for undergraduates (OIR website, retrieved 1-8-17) were retrieved to compare the percentage of students from different racial/ethnic groups in the population compared to the sample (see Table 7). White students were the most represented group in the sample followed by Hispanic students. Black students were the most underrepresented in the sample, followed by Asians, American Indians, Native Hawaiians/Pacific Islanders, nonresident aliens, and lastly, students whose ethnicity is unknown to the university.

Table 7.

Proportion of University of Minnesota SERU Invitees, Respondents, Population and Sample Representation by Ethnicity.

Institution	*Invited (n)*	*Responded (n)*	*Response Rate %*	*Population %*	*Sample %*	*Representation*
Ethnicity						
African American/Black	1287	297	23.1	4.5	2.9	-1.57
Hispanic	766	297	38.8	2.7	2.9	0.26
Asian	2809	905	32.2	9.8	8.9	-0.88
White	20661	7671	37.1	72.1	75.7	3.57
Native American	348	35	10.1	1.2	0.3	-0.88
Non-resident Alien	2413	841	34.9	8.5	8.3	-0.18
Unknown	212	78	36.8	0.9	0.8	-0.10

While we only have response rate data for one SERU 2013 institution, the findings are consistent with other response rate data based on SERU survey respondents' demographics (Chatman, 2008). White and female students tend to respond at higher rates, relative to non-respondents. Unfortunately, response rates for the 2013 SERU sample were only calculated by ethnicity and sex. Chatman also noted that students with higher grade point averages tended to respond to the SERU survey. Phase II of this study only considers data from seniors. In future studies, response rates particular to seniors' demographics would be useful in establishing that the sample does not differ in any important ways from the population, thus enhancing valid generalizations. The lack of response rate data for the population of interest will be discussed in the limitations section.

The sample was created by selecting students from the SERU 2013 multi-institutional file if respondents met certain criteria. First, only seniors were selected, as the HIPs of interest in this study are end-of-career HIPs. Second, seniors that were new high-school matriculates, or students who did not attend a previous post-secondary institution prior to enrolling, were chosen, as they would have had the maximum amount of time to engage in the HIPs of interest in their university. Third, since financial circumstances based on parental income was of primary interest, only students who identified as financially dependent were selected. Due to survey logic, only self-reported dependent students were presented with the SERU parental income bracket question. Fourth, students also needed to have a primary academic major on record with the university (as designated by

NCES's Classification of Instructional Programs, hereafter referred to as CIP code). CIP codes, which are six-digit indicators of student majors, were converted to two-digit CIP codes to indicate general field of study. The National Survey of Student Engagement (NSSE) survey applies logic to assign CIP codes to general disciplinary fields of study. That logic was used to create eight disciplinary fields of interest to this study. The number of students who met all four criteria and were included in the study was 20,475. Listwise deletion was used to ensure that everyone in the sample had data on the independent variables (race/ethnicity, sex, first-generation status, academic major within designated disciplinary fields, SERU parental income bracket, and SERU social class). The resulting final sample included 18452 records.

The SERU 2013 survey was administered in modules. All students took the core module, which included the SERU household income bracket, social class, and parental educational attainment items. The core also had items to gauge students' involvement in research with faculty, which is a Phase II outcome measure. The other two Phase II outcomes were internship participation and senior thesis/capstone experiences. These items were drawn from the academic engagement and global experiences module. Race/ethnicity, sex, and primary academic major, which were used in Phase II methods, were provided by the institutions and appended to the survey data set. Response counts for the SERU core module and demographic data was large relative to data gathered from the academic engagement module. Only 30% of respondents were randomly assigned that

module, thus there were fewer observations for participation in internships and senior thesis/capstones than research with faculty, which was measured in the core module.

High-impact practices defined.

The HIPs of interest in this study were "research with faculty", "internships" and "senior thesis/capstones". The "research with faculty" construct was measured by combining three items into one. Specifically, students were asked to "Indicate the following research and creative activities that you are currently doing or have completed as a [your university] student?" Responses included (a) assist faculty in research with course credit (24.1% participated, n=4421), (b) assist faculty in research for pay without course credit (18.4% participated, n=3383), and (c) assist faculty in research as a volunteer without course credit (22.8% participated, n=4184). Responses to each prompt indicating "Yes, doing now or have done" were simplified by recoding into a dichotomous outcome that indicated whether or not students participated in research with faculty. This recode resulted in a calculation of 40% (n=7340) of financially dependent, NHS seniors participated in research with faculty, either for pay, course credit, or volunteer. Internship participation was another HIP of interest in this study. In the academic engagement module, students were asked "Have you completed or are you now participating in the following activities at [your university]" with the following response options: "Internship under the direction of a faculty member" (15.3% participated, n=571) and "Other internship (e.g., co-op, clinical assignment)" (38.9% participated,

n=1452). This was recoded into a dichotomous measure of students that participated in an internship at their university (31%, n=1719).

The academic engagement module also had an item about participating in senior thesis/capstone experiences. The item asked students "Have you completed or are you now participating in the following activities at [your university]…capstone or student thesis courses". Of the students who responded to this item, thirty-one percent (n=1159) of students indicated that they were currently doing or have completed a senior thesis/capstone. This measure is dichotomous.

Base model: race/ethnicity, sex, and parental educational attainment.

Stepwise logistic regression (SPSS 21.0) was used to test the hypothesis that race/ethnicity, sex, and first-generation status would explain the rates of participation in conducting research with faculty (either for pay, credit, or volunteer). Further, it was hypothesized that White students, males, and non-first-generation students would have an increased odds of participating in HIPs than non-white, females, and first-generation students. This base model only included student characteristics. Later in the study, this base model was compared to a reduced model including financial circumstances and a full model, including financial circumstances and disciplinary field of study. The model comparisons provided the opportunity to evaluate the value-added of including additional student data when studying HIPs participation.

Race/ethnicity.

SERU participating institutions submit ethnicity information based on their internal records. A series of flags are used to represent membership in eight separate categories. Each student can have more than one ethnicity flag, thus resulting in duplicate counts in the case where students are multiracial (two or more ethnicities). This study used IPEDS logic to recode students into IPEDS ethnicity categories, which meet the federal government's rules for ethnicity reporting (NCES website).

If students were considered a nonresident alien by IPEDS definitions (residing in the USA temporarily), they were counted as such, regardless of ethnicity. Providing that Hispanic students were not international students, they were counted as Hispanic. After this logic was applied, the remaining students were considered "American Indian or Alaska Native", "Asian", "Black or African American", "Native Hawaiian or Pacific Islander", or "White". If more than one of these ethnicities were reported, they were considered "Multiracial". Refer to Table 8 for the percentage per racial/ethnic group, based on IPEDS definitions, for financially dependent seniors who entered college directly from high school.

Table 8.
IPEDS race/ethnicity for SERU 2013 Survey Respondents.

	n	*%*
American Indian or Native Alaskan	22	0.1
African American or Black	668	3.6
Hispanic	1784	9.7
Asian	2439	13.2
White	12093	65.5
Pacific islander or Hawaiian Native	20	0.1
Unknown	668	3.3
Nonresident alien	427	2.3
Multiracial	331	1.8

As you can see in Table 8, ethnicity data was not available for 668 students (3.3% of the sample), thus resulting in a sample size reduction from 18452 to 17742 seniors. In these cases, race/ethnicity data was marked as unknown by the institutions. Additionally, sample sizes for certain ethnic groups appeared too small, considering that equity modeling consisted of dividing the sample by sex, parental educational attainment, financial circumstances and disciplinary field of study. Thus, if necessitated, ethnicity was recoded to ensure an adequate sample size. See Table 9 for descriptive statistics.

Table 9.

Race/ethnicity for SERU 2013 (correction for missing data)

	n	*%*
White	12093	68.2
African American or Black	668	3.8
Hispanic or Latino	1784	10.1
Asian	2439	13.7
Multiracial	331	1.9
Non-resident Alien	427	2.4

Reclassification of ethnicities to improve sample size estimates resulted in the lowest group count for multi-racial students.

The base-model logistic regression was then used to estimate the odds ratios of participating in HIPs, after controlling for race/ethnicity, sex, and parental educational attainment. Since White students made up the majority of the sample and are traditionally advantaged in higher education, White students were considered the referent group for statistical analysis purposes.

Sex defined.

Sex information was provided by each SERU survey respondent institution based on their central records. Students were either categorized as "Male", "Female" or "Unknown". The majority of students were female (57.3%, n=10581). Students of unknown sex were not included in analysis. Since there were more female students in the sample, female students were considered the referent group.

Parental educational attainment defined.

The SERU survey asks four distinct questions pertaining to the mother's and father's "highest level of education reached", taking onto account that parents may have earned degrees or certificates in the "USA" or in a "foreign country". Educational response choice options included "none (did not receive formal education)", "less than high school diploma or equivalent", "high school diploma or equivalent", "associate's degree or postsecondary certificate", "bachelor's degree or equivalent", "post-baccalaureate

certificate or equivalent", "master's degree or equivalent", "professional degree or equivalent", or "doctorate degree or equivalent", or "not applicable". These four items were recoded to indicate whether either parent received a "bachelor's degree or equivalent" or higher. This definition of first-generation student status is used by the FAFSA. The percentage of financially dependent, seniors considered first-generation for this study was 14.9% (n=2752). Non-first-generation college students were considered the referent group in statistical analysis, as they made up the majority of the sample.

Reduced model: including financial circumstances.

Stepwise logistic regression, which included a (1) base model that represented significant variables found in Finley and McNair's (2013) study and (2) reduced model that included new variables that represent financial circumstances, allowing for a value-added evaluation. A logistic model comparison was conducted to evaluate if the financial circumstance terms were needed (Agresti, 2007, p. 118) in comparison with a base model that contained ethnicity, sex, and parental educational attainment. If financial circumstances did not add a significant amount of value in explaining HIPS participation, then seeking survey income data for this difficult-to-measure construct may be fruitless in future studies. This stepwise analytical technique allows for a base and reduced model comparison, thus creating results that speak directly to Finley and McNair's (2013) study, which included race/ethnicity and first-generation status when explaining differences in HIPs participation. When financial circumstances were added to the base model, it was

hypothesized that the reduced model would account for a significant amount of variation in HIPs participation, above and beyond the student characteristics base model.

Parental household income defined.

The financial circumstance construct was indicated by SERU household income bracket and social class. If students identified themselves as financially dependent, survey logic was used to present them with the SERU income bracket scale based on parent(s) household income.: "To the best of your knowledge, which category includes your parent(s) household's total annual combined income before taxes in 2009?". There were eleven distinct income bracket ranges to choose from, scaling from "less than $10,000" to "$200,000 or more". The variable has eleven unequal income category widths of household financial income.

The distribution of SERU 2013 multi-institutional and the SERU 2010 single-institution (University X) responses to the income bracket item were plotted for financially dependent seniors who matriculated to their current university as a first-time freshmen (Table 10). Much like the sample from Phase I, it is apparent from this distributional analysis that the majority of students' estimates fell between the middle- to high-income income brackets.

Table 10.

Distribution of Multi-institutional SERU 2013 and University X SERU 2010 Responses to SERU Income Bracket Item

	SERU 2013 Multi-institutional		SERU 2010 University X	
Income	*%*	*n*	*%*	*n*
Less than $10,000	1.7	305	3.3	212
$10,000 to $19,999	2.8	510	3.7	240
$20,000 to $34,999	6.1	1120	7.3	469
$35,000 to $49,999	6.4	1184	9.6	614
$50,000 to $64,999	8.1	1497	12.0	772
$65,000 to $79,999	9.8	1815	13.3	853
$80,000 to $99,999	12.9	2387	14.3	919
$100,000 to $124,999	17.8	3279	16.6	1067
$125,000 to $149,999	8.8	1617	6.5	419
$150,000 to $199.999	9.9	1829	6.1	389
$200,000 or more	15.8	2909	7.2	463

To improve power and create a parsimonious and interpretable model, SERU household income bracket was treated as ordinal rather than nominal variables. Nominal analysis including all eleven SERU income brackets resulted in small sample sizes in some categories and an overly complicated model with too many terms for meaningful interpretation. Additionally, identifying an interpretable referent group proved difficult for SERU income bracket. SERU income bracket was comprised of eleven distinct income categories, and the number of observations per category within the middle-income range was very similar. Again, it did not make sense to assign a referent group given the primary purpose of this research. This study merely looked at the impact of financial circumstances, as a whole, on HIPs participation. It is not interested in comparing differences between multiple levels of income brackets.

The ordinality of the SERU household income bracket was apparent in the results of Phase I. Both indicators' central tendency measures of the FAFSA parental adjusted gross income steadily increased with increasing levels of self-reported SERU income and social class. However, despite the assumed ordinality of the income bracket construct, the SERU parental household income brackets were comprised of eleven distinct categories of unequal widths. Agresti (2007) suggested that when a noticeable pattern is discerned between levels of the indicator (in this case, SERU income bracket) and the percentage of observations of the outcome within each level, that a researcher is justified to perform a sensitivity analysis to evaluate the appropriateness of rescoring or

collapsing categories. Income bracket categories were crossed with HIPs participation rates and standardized residuals were calculated (see Table 11).

Table 11.

Percentage of HIPs Participants and Standardized Residuals.

	Research with Faculty		Internships		Senior Thesis	
Income	*Yes %*	*Standardized Residual*	*Yes %*	*Standardized Residual*	*Yes %*	*Standardized Residual*
Less than $10,000	43.9	1.1	47.1	0.1	17.1	-9.7
$10,000 to $19,999	37.8	-0.8	45.9	0	27.9	-3.4
$20,000 to $34,999	38.0	-1.0	39.1	-1.6	29.0	-4.7
$35,000 to $49,999	38.7	-0.7	42.9	-0.7	29.9	-2.7
$50,000 to $64,999	38.6	-0.8	39.7	-1.6	30.8	-0.4
$65,000 to $79,999	40.3	0.2	43.7	-0.7	31.5	1.9
$80,000 to $99,999	40.4	0.4	44.6	-0.5	33.3	11.6
$100,000 to $124,999	41.5	1.4	49.9	1.5	30.3	-4.8
$125,000 to $149,999	39.2	-0.5	49.7	1	32.4	4.7
$150,000 to $199.999	41.5	1	48.3	.6	30.4	-2.2
$200,000 or more	39.1	-0.8	48.1	.7	32.7	9.7

Unfortunately, it did not appear that there was an optimal ordinal rescoring that would categorize participants in increasing levels of SERU income brackets when examining each HIPs participation rate. There was, however, a noticeable pattern of negative residuals for lower income categories, with the exception of the "less than $10,000" category. Perhaps the "less than $10,000" income category was too extreme and more prone to response bias. This income category had the smallest number of participants (n=303), thus the estimate might not have been as robust as the other income categories.

Thus, it was decided to dichotomize income levels into "less than $65,000" and "$65,000 and more", as negative residuals were associated with each SERU income bracket leading up to $65,000. The "less than $10,000" income category was excluded in this dichotomy. This dichotomized income indicator, as well as the original SERU income bracket scale (ordinal), were compared when modeling HIPs participation in research with faculty, internships, and senior thesis/capstone experiences.

Social class defined.

The SERU survey asks students, "Which of the following best describes your social class when you were growing up?" Responses include "wealthy", "upper-middle or professional class", "middle-class", "working-class", and "low-income or poor." These Phase I findings would suggest that there is construct validity evidence supporting the use of the SERU social class indicator to represent students' financial circumstances.

The social class distribution was also plotted. Low-income (3.4%, n=622) and working-class (13.7%, n=2522) together made up less than a 5th of the social classes. The most observations were within middle- and upper-middle class, 43% (n=7932) and 37% (n=6833), respectively. Finally, students who considered themselves from wealthy backgrounds only comprised 2.9% (n=543) of the social class observations.

The lowest and highest level of social class had the fewest observed cases. Based on the research questions of this study, a comparison of social class levels with the middle-class, which was the group with the largest number of observations, was not warranted. The social class item was treated as ordinal during analysis.

Full model: including disciplinary field of study

A logistic model comparison was conducted to evaluate if the academic discipline terms were needed to explain variance in HIPs participation rates (Agresti, 2007, p. 118) in addition to reduced model that contains ethnicity, sex, parental educational attainment, and financial circumstances. If academic discipline did not add a significant amount of value in explaining HIPS participation, then including this construct may be fruitless in future studies.

Interaction terms were added if financial circumstance and academic discipline main effects were observed. Interactions of interest in this study were between financial circumstances and academic discipline, as evaluating the appropriateness of including financial circumstances in equity models was of primary importance in this study. If the

impact of financial circumstances on participating in HIPs is influenced by disciplinary field of study, it was important to document that so the variable can be included in future equity studies.

Disciplinary field of study defined.

Institutions provided academic major information by submitting the NCES Classification of Instructional programs (CIP) codes associated with the students' instructional programs (or academic majors) to the SERU survey developers. NCES uses the CIP taxonomic scheme to track enrollment and completion for various fields of study (NCES website, see 2010 taxonomy). The first two-digits of the six-digit CIP code indicate the general field of study. For instance, a CIP code of 11 represents "computer and information sciences and support services", whereas a CIPCODE of 110299 represents "computer programming", specifically.

The study was interested in creating results that were comparable to NSSE disciplinary fields of study, as equity research has been conducted drawing upon their academic disciplinary coding schema (NSSE 2012; NSSE 2013). NSSE provided crosswalk syntax relating two-digit CIPCODES to their NSSE-defined disciplinary fields of study (NSSE, n.d.). Accordingly, I converted the SERU survey participants' six-digit code to a two-digit code and assigned students to NSSE-defined disciplinary fields using NSSE logic. This mapping condensed 506 academic majors into 37 general fields of study. After the NSSE-defined disciplinary field logic was applied, 37 fields of study were reduced to ten

overarching disciplinary fields, of which eight were of interest to the researcher. All other academic majors were considered as 'Other' (e.g., social services and health professions). If CIP codes that represented academic majors were provided in the data set that did not correspond to a NSSE-defined CIP or if it was missing for a student, it was coded as "Unknown".

The following list includes the disciplinary fields of interest in this study, as well as the distributions for senior students that considered themselves financially dependent and matriculated to the university directly from high school (hereafter referred to the 'filtered sample')

(1) "Arts and Humanities" (15.2%, n=2813),

(2) "Biological Sciences" (17.1%, n=3151),

(3) "Business" (14.3%, n=2613),

(4) "Communications, Media & Public Relations" (5.8%, n=1061),

(5) "Education" (2.9%, n=534),

(6) "Engineering" (18%, n=3318),

(7) "Physical Sciences", "Mathematics", and "Computer Science" (8.4%, n=1546), and

(8) "Social Sciences"(18.4%, n=3398).

The eight disciplinary fields were chosen because AAC&U has focused on these fields when reporting results from NSSE-based research on HIPs literature (Kuh, 2008, NSSE

2012; NSSE 2013). To be consistent with NSSE Annual Results Reports (2012, 2013) that has contributed to HIP literature, social services and healthcare professionals were excluded from the analysis. Thus, the filtered sample is composed of 18,452 students who meet the criteria of the study and do not have missing data on the independent variables. Picking a reference group for the eight disciplinary fields proved tricky, as one discipline did not stand out as a theoretically-based logical comparison group. Since financial circumstances were of primary interest in this study, the discipline with the largest proportion of lower levels of income and social class made sense to use as a referent group. The largest percentage of students reporting in the lowest SERU income brackets (parental household income from $49,999 and below), was in the social sciences (22.2%, n=490), followed by education (13.1%, n=81) and communication (12.1%, n=142). This, coupled with the fact that social sciences had the largest number of observations, led to the choice of social sciences as the referent group. Additionally, low-income/working class students made up the majority of social science majors (23.5%, n=3815). When compared to the representation of the students in the four lowest SERU income brackets, the lowest income students were over-represented in the social sciences by 22.7%. Finally, in comparison to the percentage of first-generation students in the sample (14.6%, n=2798), first-generation college students were only over-represented in three disciplinary fields; social sciences (17.8%, n=623), education (19.9%, n=110), and communications (15.6%, n=173).

In summary, lower income students and students from lower social classes tended to major in social sciences, biological sciences, communications and education, whereas higher income and social class students tended to major in business and STEM fields. A distinct pattern between income and social class was not observed for arts and humanities majors. This observation suggested the possibility of dichotomizing disciplinary field into STEM and non-STEM fields. This was done by assigning social sciences, arts and humanities, education, and communications as non-STEM disciplinary fields and biological sciences, agriculture and natural resources, engineering, physical sciences, mathematics, and computer science into STEM fields. Business students were excluded from this analysis, as some consider business a professional field, and a vast majority of the higher income and social class students majored within business. This recoding labeled 64.5% (n=8015) as STEM students and 35.5% (n=4408) as non-STEM. Since STEM was the larger group, they were considered as the referent. Analysis based on STEM and non-STEM academic major was only conducted if significant results were not observed for the eight disciplinary fields of interest in this study.

Chapter Four: Results

This chapter outlines the results of Phase I, followed by Phase II. Within Phase I, students' SERU survey self-reported parental household income and social class were compared with financial aid records at one SERU survey-participating institution. The purpose of Phase I was to examine convergent construct validity evidence using two differing method modes (survey and FAFSA). Phase II evaluates the value-added by including financial circumstance and academic field of study to a model that contained traditional HIPs equity indicators: race/ethnicity, sex, and parental educational attainment. Phase II also discusses the odds of participating in HIPs for traditionally underserved students, relative to traditionally more advantaged students.

Phase I: Household Income and Social Class Validity Evidence

Students' SERU survey self-reports of (a) parental household income and (b) social class were compared with parental adjusted gross income (P-AGI) and expected family contribution (EFC), as measured on the FAFSA. The two indicators were also crossed with students' SERU survey self-reported parental educational attainment level.

Parental financial circumstances.

Adjusted gross income.

For each SERU 2010 Income bracket, distributional descriptive statistics were calculated for financially dependent students (according to the FAFSA definition) for the 2010 financial aid award year. Some P-AGI values were negative, which is a plausible possibility, based on how adjusted gross income is calculated by the IRS tax forms.

Nonetheless, the descriptive analysis was conducted given three scenarios: (1) original data without removal or truncation of the reported P-AGI, (2) non-zero data, with negative P-AGI values recoded to zero, and (3) truncated data, including values for the inter-quartile (IQR) range, which is the middle 50% of all possible values. The three data scenarios were explored in the hopes that they would produce values that fell within the SERU income brackets, thus serving as evidence that SERU self-reported income brackets were a valid measure of actual parental household income.

While income is typically skewed positive, the lower SERU income brackets tended to be negatively skewed and the higher income brackets tended to be positively skewed. This was due to the fact that negative P-AGI values were present to a greater extent in lower SERU income brackets than in higher SERU income brackets. When the distributional properties were calculated by recoding negative P-AGIs to zero, the skew pattern for each distribution was positive. The skew statistic was typically between 2 and 4, except for the $65,000-$79,999 bracket, where it was slightly over 7. A Shapiro-Wilks test for normality indicated that all income brackets departed significantly from normality (at the 0.001 critical level), regardless of whether the original, non-negative or IQR data was analyzed. The skew statistic for the IQR of parental P-AGI roughly ranged between -1 and +1, indicating that using the IQR instead of the original data or the non-zero transformed data resulted in more of bell-shaped distributions, which is an expected result, as 25% of the extreme negative P-AGIs and 25% of the extreme positive P-AGIs did not impact the shape of the distributions.

When using the original parental P-AGI, Levine's test for Homogeneity of Variance indicated that the variances based on the mean, median, median with adjusted degrees of freedom, and the trimmed mean were statistically significant, thus equal variance could not be assumed (at the 0.001 critical level). When using the non-negative data, the Levine's test statistic also indicated significantly different variances, with larger test statistic values than when using the original distributions. When examining the IQR distribution of parental P-AGI, the Levine's test indicated statistically significant departures in variance, however, of the three data scenarios, using the IQR produced the lowest Levine's test statistic values. Due to the removal of extreme values, the P-AGI standard deviation was lower for the non-zero data scenario, and even lower for the IQR. Considering the original data only, the most variability, on average, was observed in lowest and highest income brackets (see Table 12 for descriptive statistics for each SERU income bracket).

Table 12.

Parental Adjusted Gross Income Descriptive Statistics by SERU Income Bracket for Three Data Scenarios (original, IQR, non-negative).

SERU Income Bracket	*Data Scenario*	*N*	*Median*	*Mean*	*Standard Deviation*
Less than $10,000	Original	144	$ 7,956	$ 14,780	$ 77,365
	IQR	35	$ 41,506	$ 51,090	$ 27,979
	Non-zero	144	$ 7,956	$ 23,895	$ 38,945
$10,000 to $19,999	Original	158	$ 18,451	$ 25,136	$ 31,189
	IQR	59	$ 38,750	$ 42,493	$ 17,365
	Non-zero	158	$ 18,451	$ 25,874	$ 29,746
$20,000 to $34,999	Original	369	$ 32,363	$ 37,836	$ 38,506
	IQR	283	$ 36,457	$ 42,062	$ 17,567
	Non-zero	369	$ 32,363	$ 39,579	$ 27,064
$35,000 to $49,999	Original	510	$ 50,062	$ 54,332	$ 43,375
	IQR	442	$ 51,177	$ 54,669	$ 19,658
	Non-zero	510	$ 50,062	$ 56,407	$ 34,251
$50,000 to $64,999	Original	620	$ 68,978	$ 74,995	$ 40,302
	IQR	547	$ 66,948	$ 67,849	$ 18,715
	Non-zero	620	$ 68,978	$ 75,638	$ 37,313
$65,000 to $79,999	Original	661	$ 82,915	$ 89,207	$ 50,022
	IQR	535	$ 78,038	$ 77,467	$ 18,469
	Non-zero	661	$ 82,915	$ 89,532	$ 48,722
$80,000 to $99,999	Original	708	$ 98,887	$ 103,000	$ 38,074
	IQR	485	$ 91,654	$ 87,730	$ 17,688
	Non-zero	708	$ 98,887	$ 103,067	$ 37,850
$100,000 to $124,999	Original	715	$ 119,528	$ 130,451	$ 55,918
	IQR	273	$ 97,644	$ 90,632	$ 19,811
	Non-zero	715	$ 119,528	$ 130,468	$ 55,877
$125,000 to $149,999	Original	256	$ 147,955	$ 155,611	$ 63,994
	IQR	38	$ 90,879	$ 87,100	$ 20,029
	Non-zero	256	$ 147,955	$ 155,611	$ 63,994
$150,000 to $199,999	Original	207	$ 158,348	$ 172,773	$ 92,469
	IQR	27	$ 74,357	$ 77,408	$ 22,005
	Non-zero	207	$ 158,348	$ 172,773	$ 92,469
$200,000 or more	Original	146	$ 228,838	$ 249,413	$ 140,650
	IQR	15	$ 95,767	$ 80,166	$ 30,888
	Non-zero	146	$ 228,838	$ 249,413	$ 140,650

As demonstrated in Table 12., measures of central tendency were also calculated given the three data scenarios. In comparison with the mean and median of the original data, the non-zero and IQR mean and median did not perform substantially better at producing values that were within each SERU income bracket. Thus, neither excluding the lower and upper 25% of the distribution nor eliminating non-negative values from the original P-AGI distribution resulted in values that were consistently within each SERU income bracket.

Since the primary purpose of phase one of this research study was to evaluate the valid use of the SERU income brackets to represent students' financial circumstances, the fact that the original parental P-AGI data performed better at producing within SERU income bracket values, it was decided that the original data be used for subsequent analysis. The original data worked well practically and conceptually. Conceptually speaking, negative P-AGI and P-AGI of zero are possible values and should represent the true distributional range of P-AGI's in the population, thus it was decided to use the full range of the originally observed P-AGI moving forward. Indeed, the FAFSA allows applicants to enter negative and zero P-AGI values, based on their tax filings, for the purposes of determining the EFC.

While SERU survey respondents are asked to indicate their parent(s) annual combined 2009 income, before taxes, parental adjusted gross income (after taxes) was the only data element that was available to the researcher. Given the nature of the survey item, and the

fact that students would presumably not know their parent's P-AGI (which would be less than before tax income, by definition), it was expected that students gross household income estimates would be higher than P-AGI. In general, students estimated household income bracket was lower than the average P-AGI in every SERU income bracket, regardless of whether the original data, inter-quartile range or the exclusion of negative P-AGI scenarios were used. The under-estimates were most prominent in the lowest income brackets. Tendencies for survey respondents to under-estimate annual income have also been evidenced in the Current Population Survey (Tourangeau, Rips, & Rasinski, 2000). There were two exceptions to this general pattern. When using the original P-AGI, the mean parental P-AGI was within the SERU income bracket for the highest income categories, representing $150,000 to $200,000 or more.

A One-Way Analysis of Variance on the original parental P-AGI indicated a statistically significant difference between the averages for each SERU income bracket ($F_{10, 4483} = 337.98$, $p<0.001$). Post hoc analysis was done by using the Games-Howell test statistic, which does not assume equal variances (as mentioned, Levine's test of Homogeneity of Variance suggested the equal variance assumption was not tenable). When comparing the differences between the income bracket means, the post hoc analysis indicated that all but the lowest three income bracket means ("less than $10,000", "$10,000-$19,999", "$20,000-$39,999) and between $125,000-$149,500 and $150,000-$199,999 were statistically different ($p<0.001$).

Interestingly, while the students did not perfectly replicate income brackets with their self-reports of household income, as demonstrated by the average P-AGI (using the original data), the average P-AGI steadily increased from the lowest to the highest income bracket. Further, the median income for each income bracket increased steadily, and only three of the eleven medians fell outside the SERU household income brackets. The three medians that exceeded the SERU income brackets represented the overall household income range of $35,000-$79,000 For the "$35,000-$49,999" range, the median parental P-AGI exceeded the bracket interval by $63, the "$50,000-$64,999" range was exceeded by $3979, and the "$65,000-$79,999" range was exceeded by $2916.

Expected family contribution.

When students file a FAFSA, an expected family contribution, or EFC, is calculated based on the federal student aid formula, drawing upon FAFSA data indicating parental income, number of college students in the household, assets and student earnings. EFC for the 2010 Financial Aid Award year for dependent students was analyzed to ascertain if there was a relationship between students' self-reported household income and financial aid awards. EFC is often used to determine eligibility for institutional- and merit-based grants, as well as to determine eligibility for federal student loans and grants and state grants. Parental P-AGI and EFC was found to have a strong, positive correlation ($r=0.77$, $p<0.001$).

As you can see in Table 13, with the exception of the lowest SERU income bracket (less than $10,000), both the EFC mean and the median values steadily increased as SERU

income brackets increased, providing further evidence of a relationship between financial need and SERU household income. The lowest income bracket's EFC mean of $3,139 is only higher than the second income bracket ($10,000-$19,999) at $2,534.

Table 13.

Average Expected Family Contribution (EFC) by SERU Household Income Bracket.

SERU Income Bracket	*N*	*Median*	*Mean*	*Standard Deviation*
Less than $10,000	144	$0	$3,139	$8,159
$10,000 to $19,999	158	$0	$2,535	$6,631
$20,000 to $34,999	369	$1,597	$4,465	$8,890
$35,000 to $49,999	510	$4,814	$8,295	$12,216
$50,000 to $64,999	620	$9,085	$12,750	$13,064
$65,000 to $79,999	661	$13,062	$16,385	$13,986
$80,000 to $99,999	708	$17,461	$20,492	$14,335
$100,000 to $124,999	715	$24,519	$28,121	$18,380
$125,000 to $149,999	256	$30,690	$33,436	$19,507
$150,000 to $199,999	207	$34,808	$39,707	$23,509
$200,000 or more	146	$47,997	$53,042	$27,678

A One-way ANOVA omnibus test indicated that there was a significant difference between the EFC means, overall ($F_{10, 4483} = 259.560$, $p<0.001$). A difference in variance was observed within each SERU income bracket, especially with higher income brackets doubling or tripling the variance from the lower to mid income brackets indicated that EFC was more variable among the high income brackets. Accordingly, post hoc analysis could not be based on the assumption of equal variances, thus a Games-Howell test statistic was used to estimate whether observed differences in mean EFCs was statistically significant. While the lowest three brackets of income means were statistically different from one another ($p<0.001$), the middle bracket averages were statistically equal until income was reported to be $100,000 or more There was a statistically significant difference between the mean EFC for the "$100,000-$124,999" and "$125,000-$149,500". There was also a statistically significant difference between "$125,000-$149,500" and "$150,000-$199,999".

Parental educational attainment.

In an attempt to further decipher the pattern in SERU income bracket responses, the distribution of first- and non-first generation college students across all SERU income levels was created (see Table 14). The majority of first-generation students identified with income brackets leading up to $64,999 (59%) compared to 30% of non-first-generation students. The majority of non-first generation students (55%) identified themselves within the upper income brackets of $80,000 or more, whereas only 25% of first-generation students identified these brackets. The top three SERU income brackets had 18% of non-first-generation and only 4% of first-generation students.

Within each SERU income bracket, a larger percentage of first-generation students identified with lower-income brackets (relative to their peers), and conversely, a larger percentage of non-first-generation students identified with higher-income brackets (see Table 12). When comparing average parental P-AGI between first-generation and non-first-generation college students within each income bracket, each group's average P-AGI increased as the SERU income bracket increased. Students' whose parent(s) did not earn a bachelor's degree earned less, on average, than their non-first generation peer's parents for each SERU income bracket. There was one exception to this pattern in the "$150,000-$199,999" bracket, where the average P-AGI for first-generation households (n= 24) exceeded non-first generation households (n=182) by $1053. Obviously, there are fewer first-generation households in this bracket, thus making the average more susceptible to positive outliers. Indeed, the median difference in P-AGI between the first- and non-first-generation students was $17,120 for this SERU income bracket, which is the largest median difference except for the highest income bracket ("$200,000 or more"). Within the "$200,000 or more" bracket, the difference in the median incomes for the two groups was $71,481.

Table 14.

Percentage of First- and Non-first-Generation Students within SERU Income Bracket.

	First-generation		*Non-first generation*	
SERU Income Bracket	*n*	*%*	*n*	*%*
Less than $10,000	74	56.1	58	43.9
$10,000 to $19,999	90	59.2	62	40.8
$20,000 to $34,999	196	55.4	158	44.6
$35,000 to $49,999	231	46.1	270	53.9
$50,000 to $64,999	248	40.3	367	59.7
$65,000 to $79,999	226	34.5	429	65.5
$80,000 to $99,999	170	24.1	535	75.9
$100,000 to $124,999	127	17.8	586	82.2
$125,000 to $149,999	24	9.4	231	90.6
$150,000 to $199,999	24	11.7	182	88.3
$200,000 or more	8	5.5	137	94.5

Social class.

The SERU survey asks students, "Which of the following best describes your social class when you were growing up?" Responses include "wealthy", "upper-middle or professional class", "middle-class", "working-class", and "low-income or poor". Validity evidence for the social class indicator was empirically explored by examining the relationship between students' perceived social class when growing up and

(1) Self-reported SERU 2010 income,

(2) FAFSA's Adjusted Gross Income (P-AGI), and

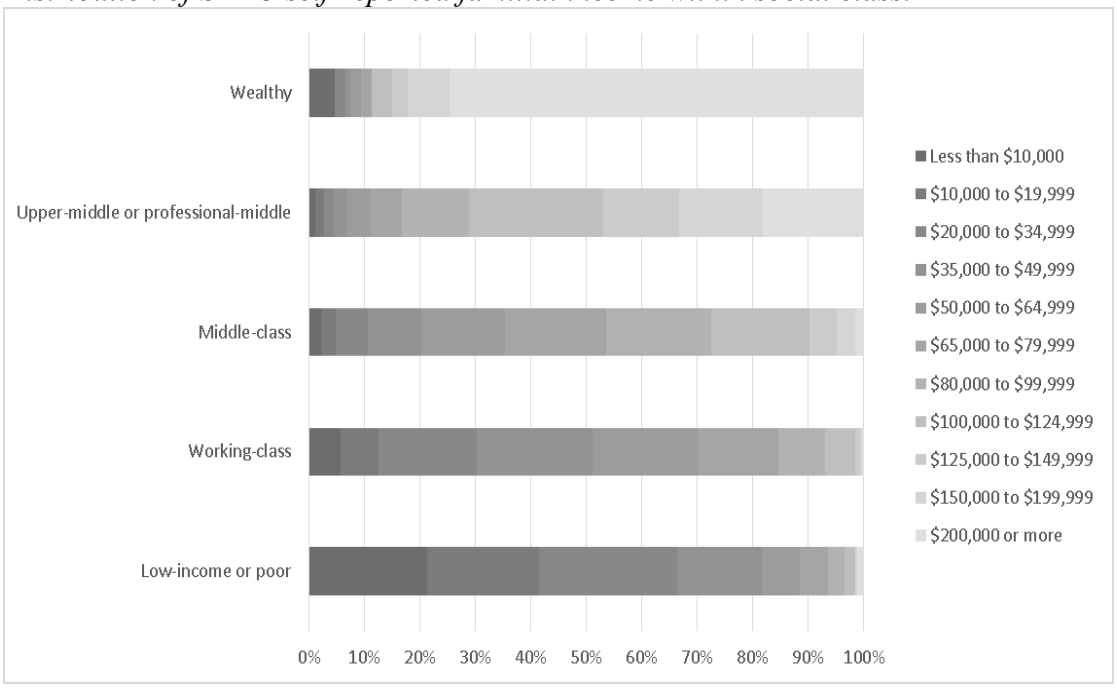
(3) Parental education

Social class and self-reported SERU income brackets.

The distribution of SERU income brackets was plotted against social class (see Figure 1). As expected, it was easy to discern a pattern between students' identification with a social class and their self-reported household income. Students on the lower end of the social class spectrum tended to identify with lower household income brackets, and conversely, higher income students tended to identify themselves with higher social classes. Indeed, Spearman's ordinal-by-ordinal correlation indicated a positive relationship between household income and social class ($r=0.579$, $p<0.001$).

Figure 1.

Distribution of SERU self-reported familial income within social class.



A contingency table analysis revealed that there was a statistical association between self-reported parental income and social class when growing up (X_{40} = 3582.625, $p<0.001$). While two cells have expected count less than 5 (3.51 was lowest expected count), the assumptions of the test have been satisfied (at least 20% of expected counts exceed 5 and no expected counts of 1 or less).

Average adjusted gross income.

Descriptively, it is apparent that average P-AGI increased as social class increased. The median P-AGI, however, did not increase for students who considered themselves as wealthy (see Table 15).

A one-way ANOVA indicated that there was a statistically significant difference between the social class groups in regards to the average parental P-AGI ($F_{4, 5077}$=306.33, $p<0.001$). Post hoc analysis indicated that the average parental P-AGI for each social class group was statistically different ($p<0.001$), with one exception: students who indicated that they were from upper-middle and professional or the wealthy class ($p=0.157$). Please refer to Figure 2 to peruse the estimate and corresponding 99% confidence interval. While the adjusted gross income is positively skewed within each social class stratum, with the exception of 'wealthy', the large sample sizes allow us to assume that sampling distributions would be approximated by the standard normal curve. It was assumed that the population variances within each social class were unequal.

Figure 2 demonstrated that as social class moves from low-income or poor to 'wealthy', the average parental P-AGI also increases. The confidence interval widths vary in magnitude, with more precise estimates for middle-class (53.1%, n=2700), followed by working-class (20.4%, n=1037), low-income (5.5%, n=279), upper-middle (20.5%, n=1042), and wealthy (0.5%, n=24). The standard errors are similar in magnitude, except for students who identified as being wealthy. Wealthy students make up less than 1% of the sample of federally-defined dependent students, possibly accounting for the extreme confidence interval width, relative to the other social class categories. Descriptive household income statistics indicated that students who considered themselves as wealthy varied widely in their household income. Indeed, the range was almost one million dollars and the interquartile range was almost $200,000. Further, the median, which is less influenced to outliers, indicated that wealthy students had a lower P-AGI than upper-middle class students. These finding suggests that the self-classification of wealthy students may be subject to error, which is a topic that will be revisited in the Discussion section of this dissertation.

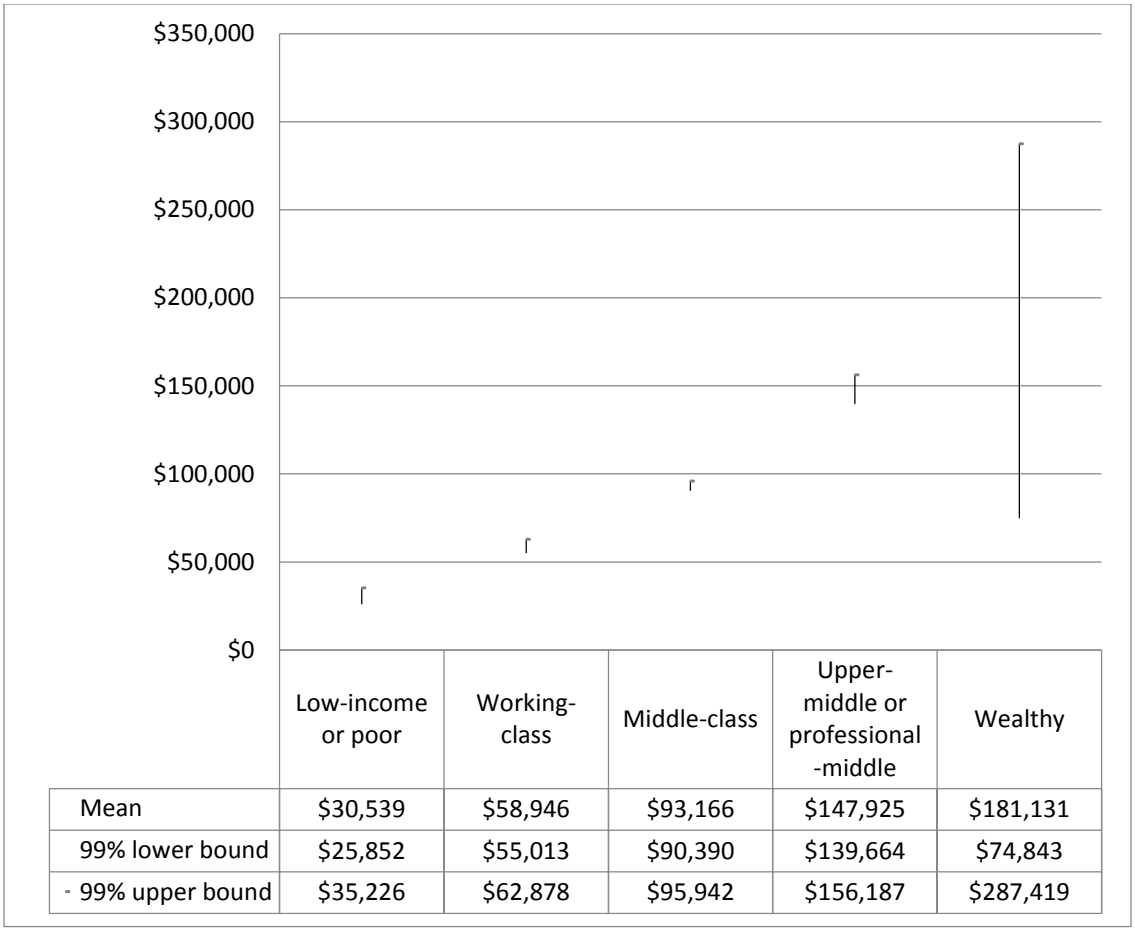
Table 15.

Mean and median P-AGI by social class.

SERU Income Bracket	*n*	*Median*	*Mean*
Low-income or poor	279	$ 25,428	$ 30,539
Working-class	1037	$ 55,412	$ 58,946
Middle-class	2700	$ 88,803	$ 93,166
Upper-middle or professional-middle	1042	$ 133,482	$ 147,925
Wealthy	24	$ 121,649	$ 181,131

Figure 2.

Estimated mean parental adjusted gross income and 99% confidence interval by social class.



Parental educational attainment.

It is known that social class is, in part, a function of parental household educational attainment. It was expected that first-generation students should be better represented in the lower-social classes and, conversely, non-first-generation students should be represented in the higher social class levels. Social class distributions were observed for first- and non-first-generation students. With the exception of students who considered themselves from a wealthy social class, the vast majority first-generation students considered themselves to be from low-income (10.2%, n=74), working-class (32.9%, n=459), or middle class (46.9%, n=2546) backgrounds. Indeed, less than one percent of first-generation students considered themselves to be wealthy. Interestingly, the majority (51.4%, n=2506) of non-first-generation students considered themselves to be from a middle-class background. Almost 39% of non-first-generation students considered their social class as upper-middle or wealthy.

When considering the proportional makeup of each social class, the pattern was as expected. A larger percentage of first-generation students (in comparison to non-first generation) were observed in the low-income (70.5%, n=74) and working-class (55.5%, n=572) categories. Conversely, larger percentages of non-first generation students made up the middle (75.5%, n=2506), upper-middle (91.6%, n=1743) and wealthy (87.5%, n=98) class.

Phase II: Equity Models

Phase II evaluates the value-added by including financial circumstance and academic field of study to a model that contained traditional HIPs equity indicators: race/ethnicity, sex, and parental educational attainment. Phase II also discusses the odds of participating in HIPs for traditionally underserved students, relative to traditionally more advantaged students.

Research with faculty.

Base model: Race/ethnicity, sex, parental and educational attainment.

Stepwise logistic regression was used to test the hypothesis that ethnicity, sex, and first-generation status would significantly explain the rates of participation in conducting research with faculty (either for pay, credit, or volunteer). The base model included race/ethnicity, sex, and first-generation student status. These indicators have been used in previous studies delving into students' participation in HIPs. the base model was statistically significant, providing evidence of the impact of these three student background characteristics on HIPs participation rates (χ^2_7=163.04, p<0.001), as indicated in Table 15. While the base model performed better than the null model by correctly predicting 60.4% of the cases, the improvement was only by 0.5%..

It was hypothesized that white students, males, and non-first-generation students would have increased odds of participating in HIPs than non-white, females, and first-generation

students, respectively. White students' odds of participating in research with faculty were compared with students of color and international students. Asian and nonresident students had significantly higher odds of participating relative to White students. Specifically, Asian students' odds of participating in faculty research were 1.7 ($p<0.001$) times that of white students. Nonresident alien students had 1.38 ($p<0.01$) the odds of participating relative to White students. There was also a significant effect observed between first- and non-first-generation students; first-generation students had 0.828 ($p<0.001$) odds of participating relative to their non-first-generation peers.

Reduced Model: Including financial circumstances.

To test the hypothesis that financial circumstances would explain variation in HIPs participation rates, above and beyond the base model (which contained ethnicity, sex, and first-generation status), stepwise logistic regression was used. Two blocks, the base model followed by the reduced model, containing the ordinal financial circumstance indicators, were entered.

When SERU income bracket was treated as ordinal, the financial circumstance indicators did not significantly improve the ability to explain variation in faculty research participation rates ($\chi^2_2 = 2.819$, $p=0.244$). Knowing students' social class and SERU income bracket did not provide valuable information in predicting participation rates. Perhaps the error introduced by the eleven separate income brackets and treating the

variable as ordinal detracted from the measure's ability to detect an association between income and HIPs participation.

As mentioned in the methods section, a sensitivity analysis was conducted to evaluate the appropriateness of re-categorizing the eleven SERU income brackets. The only justifiable re-categorization, based on the observable cut off between lower and higher research participation rates, was between $50,000-$64,999 and $65,000-$79,999 (excluding the "less than $10,000" category, which was anomalous). When replacing the ordinal measurement of SERU income bracket with the dichotomized SERU income brackets ("less than $65,000" and "greater than or equal to $65,000" categories), the reduced model including financial circumstances was an improvement over the base model that included student characteristics only (model change $\chi^2_2=9.28$, $p<0.01$); however, the effect was small. The percentage of cases predicted correctly by the dichotomous income model was only improved by 0.7% in comparison to the null model. Students with household income of less than $65,000 had less odds of participating in research with faculty than students from higher income brackets (OR=0.867, p=0.002).

Full Model: Including academic major.

As mentioned in the methods section, the results of the sensitivity model suggested that dichotomizing the ordinal measurement of SERU household income bracket may prove useful in manifesting the financial circumstance construct when predicting research with faculty participation. The full model results were calculated separately for the ordinal and

dichotomous SERU income bracket measure. If the reduced financial circumstances model added significant value in explaining participation in faculty research, above and beyond a model containing only student characteristics, interactions between the disciplinary fields and financial circumstances were explored separately for the two SERU income measurement scenarios.

Ordinal measurement of household income.

Adding disciplinary field of study to the reduced model resulted in a significant model change statistic (χ^2_7=1406.66, p<0.001). The full model, containing student demographics, financial circumstances, and academic discipline, was statistically significant (χ^2_{16}=1572.52, p<0.001). Including disciplinary field of study to the model results in a 5.4% improvement in prediction over the null model, moving the percentage of cases correctly predicted from 59.9% to 65.3%. Table 16 summarizes the results of the comparison between the base, reduced, and full model when treating social class and household income as ordinal.

Table 16.

Research with Faculty: Chi-square Change Comparisons Between the Base, Reduced, and Full Model (Using Ordinal Financial Circumstance Indicators).

	X^2	*df*	X^2 *change*	*df change*
Base Model: Student Characteristics	163.043***	7	-	-
Reduced Model: Financial Circumstances	165.861***	9	2.819	2
Full Model: Academic Discipline	1572.52***	16	1406.659***	7

*p<0.05, **p<0.01, ***p<0.001

In reference to the social sciences, all other disciplinary fields differed by a significant amount in terms of their research with faculty participation odds except engineering (see Table 17). After controlling for ethnicity, sex, first-generation status, social class, and SERU income bracket, Arts & Humanities, Communications, Business, and Education students had lower odds of participating in research with faculty than social science students. Biological and physical science students had greater odds of participating. Please refer to Table 17 to evaluate odds ratios of participating in research with faculty for each stepwise model.

Table 17.

Research with Faculty: Stepwise Logistic Regressions Odds Ratios and Full Model Confidence Intervals (Using Ordinal SERU Income)

				Full Model CI(99%)	
Research with Faculty	*Base Model*	*Reduced Model*	*Full Model*	*Lower*	*Upper*
Base Model: Student Characteristics					
African American or Black	1.073	1.071	1.042	0.834	1.302
Hispanic or Latino	1.066	1.064	1.047	0.907	1.208
Asian	1.71***	1.709***	1.473**	1.301	1.667
Multiracial	0.974	0.973	0.941	0.691	1.283
Nonresident Alien	1.382**	1.405**	1.541**	1.178	2.014
First-generation	0.828***	0.829***	0.835**	0.733	0.953
Males	0.941	0.939	0.897**	0.821	0.979
Reduced Model: Financial Circumstances					
Income	-	1.012	1.013	0.992	1.035
Social Class	-	0.966	1	0.935	1.069
Full Model: Disciplinary Field of Study					
Arts and Humanities	-	-	0.46***	0.397	0.533
Communications, Media and Public Relations	-	-	0.435***	0.353	0.537
Biological Sciences, Agriculture and Natural Resources	-	-	2.361***	2.063	2.702
Business	-	-	0.414***	0.355	0.482
Education	-	-	0.476***	0.358	0.632
Engineering	-	-	0.923	0.808	1.056
Physical Sciences, Mathematics and Computer Science	-	-	1.221**	1.036	1.439
N (%)	17660 (95.7)	17660 (95.7)	17660 (95.7)		

*p<0.05. **p<0.01, ***p<0.001

Dichotomous measurement of household income.

It was hypothesized that disciplinary field would interact with financial circumstances, as lower-income and social class students were over-represented in the social sciences. As discussed in the methods section, this interaction would only be tested if there was a main effect for both financial circumstances and academic discipline. When SERU income level was treated as ordinal, the reduced model representing financial circumstances was not found to add significant value in predicting research with faculty participation above the base model of student characteristics. However, when SERU income was dichotomized based on the $65,000 cut off that was identified in the sensitivity analysis, there was an income effect (Table 18). The full model using dichotomized SERU income resulted in 65.2% correct predictions of participation, which is a 5.3% boost over the null model

Table 18. Model Change Comparison Statistics when Using Ordinal or Dichotomous SERU Income.

	Ordinal SERU Income					*Dichotomous SERU Income*				
	X^2	*df*	X^2 *change*	*df change*	*% predicted correctly*	X^2	*df*	X^2 *change*	*df change*	*% predicted correctly*
Base Model: Student Characteristics	163.043***	7	-	-	60.4	164.79***	7	-		60.4
Reduced Model: Financial Circumstances	165.861***	9	2.819	2	60.4	174.08***	9	9.28**	2	60.6
Full Model: Academic Discipline	1572.52***	16	1406.659***	7	65.3	1545.07***	16	1370.99***	7	65.2

*p<0.05, **p<0.01, ***p<0.001

As you can see in Table 18., while the ordinal SERU income bracket and social class block did not add significant value in predicting research with faculty participation, replacing the ordinal income indicator with the dichotomized indicator did (χ^2_1=9.282, p=0.01). The effect, however, was minimal, as the predicted participation rate only improved from 60.4% to 60.6%. Further, the odds ratio of participating in research with faculty was statistically significant when SERU income was dichotomized (see Table 19). After controlling for student characteristics and disciplinary field, students with SERU-reported income of less than $65,000 were less likely to participate relative to their higher-income peers (OR=0.867, p=0.002).

Table 19.

Research with Faculty: Stepwise Logistic Regressions Odds Ratios and Full Model Confidence Intervals (Using Ordinal and Dichotomous SERU Income Scale).

	Ordinal SERU Income			*Dichotomous SERU Income*		
Research with Faculty	*Base Model*	*Reduced model*	*Full Model*	*Base Model*	*Reduced Model*	*Full Model*
Base Model: Student Characteristics						
African American or Black	1.073	1.071	1.042	1.08	1.086	1.056
Hispanic or Latino	1.066	1.064	1.047	1.057	1.063	1.046
Asian	1.71***	1.709***	1.473**	1.723***	1.728***	1.493***
Multiracial	0.974	0.973	0.941	0.962	0.962	0.928
Nonresident Alien	1.382**	1.405**	1.541**	1.376**	1.418***	1.559***
First-generation	0.828***	0.829***	0.835**	0.823***	0.836***	0.841**
Males	0.941	0.939	0.897**	0.939**	0.935*	0.892**
Reduced Model: Financial Circumstances						
Income	-	1.012	1.013		0.877**	0.867**
Social Class	-	0.966	1		0.958	0.991
Full Model: Disciplinary Field of Study						
Arts and Humanities	-		0.46***			0.459***
Communications, Media and Public Relations	-		0.435***			0.43***
Biological Sciences, Agriculture and Natural Resources	-		2.361***			2.333***
Business	-		0.414***			0.415***
Education	-		0.476***			0.469***
Engineering	-		0.923			0.917
Physical Sciences, Mathematics and Computer Science	-		1.221**			1.221***

*p<0.05, **p<0.01, ***p<0.001

Since a main effect was detected when SERU income was dichotomized, an income by discipline interaction was explored. To ease interpretability, an interaction was calculated between the dichotomized income and STEM and non-STEM disciplines (excluding business students). As in earlier analysis, students with reported SERU income bracket of "less than $10,000" were excluded from the analysis. Additionally, students in STEM fields (biological sciences; agricultural and natural resources; physical sciences, mathematics, and computer science) had higher odds of participating in research with faculty relative to social science students (OR=3.238, $p<0.001$). The interaction between dichotomized SERU income and STEM student status was not statistically significant (OR=0.883, p=0.216).

Internships.

Base model: Race/ethnicity, sex, and parental educational attainment.

The model including ethnicity, sex, and first-generation student status was statistically significant (χ^2_7=18.54, p=0.01), however, if a more stringent critical cut off was used, like α=0.001, the base model would not be considered statistically significant. The model was correct at predicting internship participation for 53.4% of the observations, which was actually less effective than the null model, which correctly predicted 53.6% of cases merely by using the largest group in the sample (which in this case was the percentage of students who did not participate in internships). Only one beta was statistically significant, and that was for first-generation student status. First-generation students had

a lower odds of participating in internships relative to non-first-generation students (OR=0.702, p<0.001).

Reduced Model: Including financial circumstances.

Adding financial circumstances to the base model did not result in a significant model change (χ^2_2=3.48, p=0.175). Social class and SERU income bracket were not significant predictors of internship participation. Replacing the ordinal measurement of SERU income bracket with the dichotomized measure (created as a result of the sensitivity analysis) also did not result in a significant advantage of using the financial circumstances block over the base model of student characteristics when explaining internship participation (χ^2_2=4.461, p=0.107).

Full Model: Including academic major.

Adding academic discipline to the reduced model resulted in a significant model change (χ^2_7=188.901, p<0.001). The full model was statistically significant (χ^2_{16}=210.97, p<0.001) and it correctly predicted 61.4% of the observations, which is a notable improvement over the null (53.6%), base (53.4%) and reduced (54.4%) models. Relative to social science students, communications (OR=2.7, p<0.001) , business (OR=2.58, p<0.001), and engineering (OR=1.97, p<0.001) students had significantly higher odds of participating in internships relative to social science majors. Please refer to Table 20 to evaluate odds ratios of participating in internships for each stepwise model.

Table 20.

Internships: Stepwise Logistic Regressions Odds Ratios and Full Model Confidence Intervals.

				Full Model CI(99%)	
Internship Participation	*Base Model*	*Reduced Model*	*Full Model*	*Lower*	*Upper*
Student Characteristics					
African American or Black	1.032	1.061	1.122	0.685	1.84
Hispanic or Latino	0.877	0.89	0.851	0.625	1.157
Asian	1.086	1.109	1.133	0.872	1.473
Multiracial	0.935	0.94	0.935	0.461	1.894
Nonresident Alien	1.257	1.287	1.109	0.57	2.16
First-generation	0.702***	0.743**	0.689**	0.521	0.91
Males	0.958	0.953	0.851*	0.704	1.028
Financial Circumstances					
Income	-	1.029	1.017	0.973	1.062
Social Class	-	0.979	0.965	0.836	1.114
Disciplinary Field of Study					
Arts and Humanities	-	-	0.987	0.726	1.342
Communications, Media and Public Relations	-	-	2.709***	1.792	4.095
Biological Sciences, Agriculture and Natural Resources	-	-	0.753*	0.559	1.014
Business	-	-	2.581***	1.874	3.553
Education	-	-	1.123	0.614	2.054
Engineering	-	-	1.965***	1.46	2.645
Physical Sciences, Mathematics and Computer Science	-	-	0.838	0.569	1.233
N (%)			3614 (19.6%)		

*p<0.05. **p<0.01, ***p<0.001

Senior thesis or capstone experience.

Base model: Race/ethnicity, sex, parental and educational attainment.

While the base model containing ethnicity, sex, and first-generation status was statistically significant (χ^2_7=18.98, p=0.008), it did not improve the prediction of senior thesis/capstone participation above and beyond the null model. There was only one statistically significant beta; non-resident aliens. Relative to white students, non-resident alien students had higher odds of participating in senior thesis/capstones than white students (OR=2.16, p=0.002).

Reduced Model: Including financial circumstances.

Adding financial circumstances (social class and SERU income bracket) to the base model did not help explain participation in senior thesis and capstones (χ^2_2=1.073, p=0.59). Neither SERU income bracket nor social class contributed to explaining variation in senior thesis/capstone participation. Further, replacing the ordinal measurement of income bracket with the dichotomized measure (created as a result of the sensitivity analysis) did not result in a significant advantage of using the financial circumstances block over the base model of student characteristics when explaining senior thesis/capstone participation ($\chi^2_2$0.347, p=0.841).

Full Model: Including academic major.

Adding academic discipline to the model helped explain senior thesis/capstone participation, above and beyond the base model of ethnicity, sex, and first-generation

student status and financial circumstances (χ^2_7=68.06, p<0.001). The full model was statistically significant (χ^2_{16}=88.11, p<0.001). The full model correctly classified 69.2% of the participant and non-participant observations, which was not an impressive improvement over the null model (69.1%). Relative to social science students, communications (OR=1.631, p=0.003), arts and humanities (OR=1.481, p=0.002), and engineering students had higher odds of participating. Education majors had lower odds of participating in senior thesis/capstones relative to social science majors (OR=0.346, p=0.002). Please refer to Table 21 to evaluate odds ratios of participating in senior thesis or capstones for each stepwise model.

Table 21.

Senior Thesis: Stepwise Logistic Regressions Odds Ratios and Full Model Confidence Intervals.

				Full Model CI(99%)	
Internship Participation	*Base Model*	*Reduced Model*	*Full Model*	*Lower*	*Upper*
Student Characteristics					
African American or Black	0.946	0.965	0.999	0.588	1.697
Hispanic or Latino	0.789	0.797	0.777	0.555	1.088
Asian	1.001	1.016	1.054	0.799	1.39
Multiracial	0.819	0.822	0.809	0.375	1.746
Nonresident Alien	2.161**	2.189**	2.358**	1.231	4.52
First-generation	0.856	0.891	0.878	0.652	1.183
Males	1.101	1.097	1.039	0.851	1.268
Financial Circumstances					
Income	-	1.016	1.014	0.968	1.063
Social Class	-	0.997	0.999	0.857	1.164
Disciplinary Field of Study					
Arts and Humanities	-	-	1.481**	1.073	2.043
Communications, Media and Public Relations	-	-	1.631**	1.074	2.475
Biological Sciences, Agriculture and Natural Resources	-	-	0.817	0.591	1.131
Business	-	-	1.014	0.721	1.428
Education	-	-	0.346**	0.141	0.848
Engineering	-	-	1.545***	1.13	2.111
Physical Sciences, Mathematics and Computer Science	-	-	0.836	0.548	1.276
N (%)			3622 (19.6)		

*p<0.05. **p<0.01, **p<0.001

Chapter Five: Discussion

Given that HIPs are associated with positive student outcomes, it is imperative that they are promoted and optimally positioned to help students achieve positive outcomes that are associated with a college education. This study examined traditionally underserved students' equitable representation in HIPs (research with faculty, internships, and senior theses/capstones). Traditional equity indicators, such as race/ethnicity, first-generation status, and sex were modelled to add to the dialogue created by extant HIPs equity studies (Kuh, 2008; Finely, 2011; Finley & McNair, 2013). This study is unique in the fact that it also included students' financial circumstances and disciplinary field of study when trying to understand who participates in HIPs. Construct validity evidence of self-reported financial circumstances, as measured on student engagement surveys, is presented and implications for measurement are discussed.

Phase I: SERU Income and Social Class Validity Evidence

Phase I of this study paired financially dependent students' SERU survey self-reported parental household income and social class with financial aid records at one large, Midwestern research-intensive university. This sample is restricted to a single institution and thus the findings are limited in their generalizability. The purpose of the pairing was to assess construct validity evidence of self-reported financial indicators. Since these indicators were to be used in Phase II of this study as a means to assess the value-added of including students' financial circumstances when explaining equitable access and representation in HIPs. The use of self-reported financial circumstance indicators have

been under scrutiny by agencies such as the NCES (2012). With this in mind, Phase I of the study was designed to assess construct validity evidence of the two primary financial indicators used in this study to represent financial circumstances.

Eleven distinct income bracket response options were available to 2010 SERU survey respondents ranging from "less than 10,000" to "$200,000 or more". Parental Adjusted Gross Income (P-AGI) and Expected Family Contribution (EFC) were merged with survey respondents' self-reported income bracket. With a few exceptions, students in the sample were fairly good, on average, at reporting their parents' household income. The *median* P-AGI was within the range of ten out of eleven SERU income brackets (with rounding). In the two brackets where the median exceeded the range ("$50,000-$64,999" and "$65,000-$79,999"), the range was only exceeded by about $4,000 and $3,000, respectively. This finding suggests that SERU income brackets are descriptively related to the median of P-AGI, in an aggregate sense.

The *average* P-AGI, however, was under-estimated in all but the two highest SERU income brackets. The finding that the median may be a better measure of income is not surprising, especially knowing that income distributions tend to be positively skewed in the general population, and indeed, were skewed within each SERU income bracket subsample. Very large incomes inadvertently inflate the average. Under-estimation of annual income has been a common phenomenon in the Current Population Survey, and scholars posit that the task of remembering every income detail within a specified time

interval proves difficult and respondents tend to only remember significant income sources (Tourangeua, Rips & Rasinski, 2000). It is remarkable, despite the under-estimation, that the average P-AGI steadily increased from the lowest to the highest SERU income bracket, and the vast majority of under-estimates being less than $5,000. For the two highest income brackets, "$150,000-$199,999" and "$200,000 or more", the average P-AGI estimate was within range. Perhaps students know their parental household income best when the income is high. A more likely story is that the extreme variability, as indicated by the standard deviation for these two income brackets, indicated that there was wild variation in responses in these categories. In fact, the P-AGI for the lowest income bracket was also highly variable. Many researchers have observed this phenomenon in extreme ends of scale continuums (as documented in Tourangeau, Rips, & Rasinski, 2000).

Crossing SERU income brackets with Expected Family Contribution (EFC), as calculated on the FAFSA, resulted in findings that can also be interpreted as evidence that students are fairly accurate at indicating their family's financial circumstances. Based on the formula for calculating EFC, which is largely a function of P-AGI, it is not surprising that EFC and P-AGI have a strong, positive relationship. But do measures of central tendency, like the median and average EFC, steadily increase as one moves up the SERU self-reported income bracket scale? The answer is yes.

Interestingly, in the lowest three income brackets, the median and average EFC would qualify students for the Pell grant, which is a need-based grant provided to students from the lowest income backgrounds. This finding, coupled with the fact that average P-AGI was not statistically different in the three lowest income categories, suggests that perhaps the SERU income bracket scale can be collapsed to include incomes of less than or equal to $40,000 to represent "low income". Including more responses in this category may ameliorate the potential impact that extreme responses may have in the lowest income categories. Indeed, while the average EFC was $0 in the less than $10,000 bracket, the average EFC was larger than the adjacent income category of $10,000-$19,999. On the opposite end of the SERU income bracket spectrum (income brackets representing $100,000 or more), the median and average EFC were too high, typically making students ineligible for typical need-based financial aid. A re-categorization of SERU income bracket should take into account the practical significance of income categories in terms of identifying students who would be eligible for need-based financial aid. For instance, in the 2016-2017 academic year, dependent students from families with combined incomes of less than $25,000 were automatically assigned an EFC of $0 (Information for Financial Aid Professionals, n.d.) and students from families with incomes less than $50,000 qualify for a simplified EFC calculation, in which assets are not considered in the formula.

Finally, first-generation status was also associated with SERU income brackets, as would be expected, given that we know that parental education is associated with education

outcomes (NCES, 2012). A larger percentage of students who indicated that neither parent received a baccalaureate degree considered themselves as from the lower SERU income brackets. Additionally, for each lower SERU income bracket, a larger percentage of first-generation students were observed than non-first-generation students. This observation serves as additional validity evidence that the SERU income brackets capture students' financial circumstances, assuming that parental education is indeed related to income, which we know from the literature, is the case.

Not only were students' self-reported social class associated with P-AGI, EFC, and parental education, social class was also associated with the SERU income brackets. The largest percentages of students who identified as low-income/working class also identified with being in the lowest SERU income brackets. As in the case with the SERU income brackets, median and average P-AGI steadily increased as social class increased with one categorical exception; wealthy. Students who identified as wealthy had a lower median and average P-AGI than the adjacent category of upper-middle class/professional. This finding is suspect though, as only 24 students self-identified as wealthy, resulting in less precise estimates of true social class, and wide variability in P-AGI for students who identified as wealthy. Perhaps students wanted to appear positive, as wealth in the United States is typically admired. Interestingly, the mean P-AGI between upper-middle and wealthy students was not significantly different. Perhaps students vary widely in the conception of wealthy is, and while some think they are wealthy, others may use a different measuring gauge and consider themselves upper-middle class. The majority of

SERU survey respondents identified as being in the middle class. As pointed out in the literature review, students from all socioeconomic backgrounds have a tendency to associate themselves with the middle class (Walpole, 2007).

Surveys in general should stay away from value-laden terms, and the term wealthy can not only be hard to interpret and thus hard to map a response to the social class scale, but also conjure negative emotions among students. The wording low-income/poor used on the survey could also have the same impact. Cognitive interviews should be conducted to better understand how students make sense of these words, how they conjure up thoughts, and then how they translate those thoughts onto the social class scale.

NCES (2012) noted the difficulty of measuring social class, especially when using self-reports. They suggested that additional measures should be used, such as parental occupational status and the possession of social capital, to better understand social class. It is recommended that occupational prestige should also be included in the survey, as this indicator has been empirically linked to positive educational outcomes. Finally, more measures of financial circumstances should be used to fully define the construct and perhaps an SES composite should be developed, along the same vein of other popular research studies, such as those conducted by NCES.

In summary, with the exception of the lowest and highest SERU income brackets, there is slight evidence of convergent validity in the sense that P-AGI and EFC, as they are

collected from entirely different methods (FAFSA) than the student survey. Campbell and Fiske (1959) emphasized the importance of establishing construct validity, which is in part done by examining convergent validity through examining relationships between constructs by using uncorrelated methods. The social class measure also has some evidence of construct validity, because as social class increased, so did the measures of central tendency for P-AGI and EFC. Social class was positively related to SERU income bracket in the sense that higher proportions of students identifying with the low-income/working class perceived themselves from lower income brackets. Social class was also related to parental baccalaureate degree attainment, as students from first-generation backgrounds were over-represented in the lower social classes, and conversely, non-first-generation students were over-represented in the higher social classes. It was noted that the extreme categories may be problematic for reasons discussed, thus recommendations were made to improve the measurement of the financial circumstance construct.

Recommendations based on Phase I results.

If I were to have the opportunity to work with merged data from the FAFSA P-AGI and students' self-reported SERU income brackets again, I would expand on Phase I findings based on P-AGI measures of central tendency within SERU income bracket. First, I would create SERU income brackets using P-AGI. For instance, students with a P-AGI of less than $10,000 would be grouped. This would be done for all eleven SERU income bracket response options. Second, I would compare the P-AGI income brackets with self-

reported SERU income brackets. If a student's actual P-AGI bracket matched their self-reported SERU income bracket, then she/he would be counted as correctly self-reporting. Third, within each P-AGI income bracket, the percentage of students who correctly identified would be calculated. Returning to the example, knowing what percentage of students within the SERU income bracket of less than $10,000 who actually had a parental AGI of less than $10,000 would be illuminating. If the vast majority of students were indeed correct at self-reporting parental income, this would serve as further evidence of convergent validity. Relying upon measures of central tendencies within SERU income brackets masks the degree to which students were either correct or incorrect at self-reporting parental household income, which is a limitation of this study.

Phase II: Building Equity Models

Contextualizing results.

Before I delve into the findings based on the equity models used in this dissertation, I would first like to remind the reader of the factors that must be considered before one attempts to generalize the results to populations of interest. First, this study was conducted at large, doctoral-awarding, research intensive universities, many of which are selective in admissions. Students that gain admission to these institutions as first-time freshman, and then persist to their senior year, undoubtedly have unique characteristics that would impact whether or not they would participate in HIPs, such as academic motivation. Additionally, all of the seniors in the sample had a declared major. Generalizations from the results of this study would only be appropriate to students at

similar institutions that meet the unique characteristics of this sample. Additionally, one must take into account that this was a census survey administered at 14 institutions that met the criteria for membership in the Association of American Universities, which is a membership that is only extended to institutions that meet specific standards indicating that they "are on the leading edge of innovation, scholarship, and solutions that contribute to scientific progress, economic development, security, and well-being" (AAU, n.d.). Generalizations should also be limited to students who are willing to take web-based student engagement surveys that were delivered to their university email account.

Another considerable factor which was not considered in this dissertation is that some experiences, such as internships and research with faculty, have entry requirements, which may inhibit or increase students' chances to participate. Bensimon (2004) noted that institutional policies may act as barriers to access, and may inadvertently select for students from certain ethnic/racial backgrounds. On the flipside, while there may barriers for some students to participate, other students may have enhanced opportunities. Perhaps there are programs in place to encourage students of color, women, and first-generation college students to participate in HIPs. The academic major can serve as a barrier or an opportunity to participation for certain students. For instance, a major in a lab science may require research with faculty as part of the curriculum, and students from different racial/ethnic backgrounds may tend to major in lab sciences.

Since this dissertation drew from data collected from 14 large, research intensive universities, I was not able to hone in on specific opportunities for participation in HIPs at each university, According to the Boyer Report (1998), research universities are in the unique position to capitalize on their research programs and social networks, and it is assumed that students would have access to these HIPs. I did not explore potential barriers or opportunities which may have limited or encouraged participation for certain groups of students at the sample institutions. If students do not have the opportunity to participate, they obviously will not. The lack of institutional context should be taken into account when generalizing the results of these studies to similar populations of interest. In the future, a more in depth study, which could include qualitative case study methods paired with survey results would allow for the context of the university setting to be taken into account when trying to understand who has access to and participated in HIPs.

Now that we have discussed some of the limitations of the study and the limits on generalizability of the findings from this study to other collegiate contexts, let's dive in to the results and discussion. This section briefly summarizes the results of using typical equity study indicators such as race/ethnicity, sex, and parental educational attainment when explaining HIPs participation, while acknowledging the fact that future studies should include additional explanatory variables associated with HIPs participation. Second, the impact of including financial circumstances and academic discipline in expanded HIPs equity modelling findings are summarized. In this section, implications

for measuring SES of college students will be discussed. Third, the importance of including academic major when understanding HIPs participation is underscored.

Traditional HIPS equity indicators.

Astin's (1993) input-environment-outcomes theory would suggest that students background characteristics, or "inputs", impact what students do while in college. The results of this study support this assumption. While modeled separately, the impact of race/ethnicity on HIPs participation was similar across all three HIPs. Relative to White students, Black and Hispanic students, who were considered as traditionally underserved in previous equity studies (Finley, 2011; Finley & McNair, 2013; Kuh, 2008; NSSE, 2012; NSSE, 2013), had statistically equal odds of participating in all three HIPs. Asian and International students had higher odds of participating in research with faculty relative to White students. International students had higher odds of participating in capstones relative to White students. These were the only significant odds ratios in terms of race/ethnicity for all three HIPs.

As a reminder, Finley (2011) defined traditionally underserved students as those who are from "historically underrepresented racial/ethnic minorities groups, transfer, first-generation, and part-time students" (p. 1). It must be noted that traditionally underserved students in this dissertation were academically prepared, as they were able to gain admissions into AAU research-intensive universities, all of which have selective admissions. The generalizability of the results is limited to traditionally underserved

seniors that attend similar types of institutions, entered the institution as first-time freshman, are financially dependent (under 24 years old), and have a decalred major on record. Gross generalizations to traditionally underserved students across diverse institutional types are not warranted.

Before we continue to interpret the findings in this study, it must be noted that the models used in this study are underspecified. There are many other variables that may be associated with HIPs participation that were not included in the study due to the lack of data. While Astin (1993) emphasized that statistical controls should be used when studying college impact, such as student background characteristics similar to the ones used in this dissertation, he also noted the importance of controlling for other potential confounders. Academic preparation, personal characteristics, motivation, goals and aspirations, reasons for choosing a major, and intentions for involvement while in college should all be controlled for. By narrowly focusing on HIPs equity indicators, the models used in this study were underspecified. The reasons for this were in part due to the lack of measurements for these other potential confounders, as well as my desire to produce results that were comparable to NSSE-based HIPs equity studies. The prediction of HIPs participation would be improved by using variables that represent the complexity involved, beyond the use of student background characteristics.

As discussed in the literature review, the findings from previous HIPS equity studies were mixed in regards to how students' racial/ethnic background impacted HIPs

participation. Previous studies drew their results from the NSSE universe, which includes a wide variety of institutional types, of which only one type is large, research-intensive universities. Indeed, Astin's (1993) conceptual framework accounted for institutional type as having an impact on the student experience in general, and the environment that students are exposed to, in particular. Limiting the population of interest to only large, research intensive universities allowed this study to control for institutional type, by research design, and the findings of this study may not be directly comparable to those conducted with NSSE data. Further, while NSSE-based equity studies limited their analysis of end-of-academic-career HIPs to include only seniors, this present study only included seniors with declared majors who considered themselves as financially dependent according to FAFSA definitions.

Astin's (1993) theory highlights temporal distinctions in his conceptual model, directly highlighting the importance of the duration of exposure. Seniors undoubtedly have more time to be impacted by college. These three sample delimiters may account for the difference between NSSE- and SERU-based equity study findings. Perhaps Black and Hispanic students who attend large research universities are encouraged to participate in HIPs to a greater extent than at other institutional types. Further equity study research should be conducted by institutional type to control for this potential confounding variable.

Another finding that was consistent with two of the three HIPs (research with faculty and internships) is the fact that first-generation students had less odds of participating relative to their non-first-generation counterparts. It was hypothesized that first-generation students would be at more of a disadvantage relative to peers, as this has been consistently noted in HIPs equity studies (Finley & McNair, 2013; Finley, 2011; Kuh, 2008; NSSE, 2012; NSSE 2013). Some studies use first-generation status as a proxy for socio-economic status. This study treated it as a background characteristic to be consistent with other HIPs equity studies. Perhaps modeling students' financial circumstances by including parental education with measures of household income and social class would have resulted in a significant model effect, above and beyond a model containing race/ethnicity and sex. Further research is needed to examine if this would be the case.

One surprising finding from this study is that perhaps male students were at a disadvantage, relative to their female counterparts. Males had less odds of participating in research with faculty and internships (when using the full model). Sex was either not included in previous equity studies, or did not appear to have an impact on HIPs participation rates. In recent times, it has been noted that males are not matriculating to college, persisting through graduation, and performing academically at the same rate as females. Perhaps it should come as no surprise that males are not engaging in educational opportunities, such as HIPs, at the same rate as females. There is a growing body of research on the sex effect, and further studies should include an analysis as to why males,

who have been traditionally advantaged in higher education, may not be participating in HIPs at the same rates as females. Again, the generalization of these results are limited to the sample delimiters in this dissertation.

Financial circumstances.

While this dissertation looked at the impact of students' financial circumstances on participation in three separate HIPs (faculty research, internships, and capstones), the findings were similar. Financial circumstances, specifically students' perceptions of their parental household income and social class, did not contribute to explaining who participates in HIPs, regardless of whether the household income scale was treated as ordinal or dichotomized based on the $65,000 cutoff. There was one exception to this general finding: Students from household incomes of less than $65,000 had less odds of participating in research with faculty than students from higher income backgrounds. The effect was small though.

Based on the link that has been consistently documented in the literature between financial circumstances and higher education participation and outcomes in general, it was surprising that this study did not detect a similar association. This section discusses potential reasons that financial circumstances did not aid in the prediction of HIPs participation, including (1) potential errors presenting during the survey response process, (2) the need for more robust set of SES indicators, and (3) the need for an expanded conceptualization of SES in a way that fits the population of college students.

First, perhaps the lack of significant findings was due in part to the cognitive components of the survey response process. In an attempt to understand and reduce the sources of response effects, Tourangeau, Rips, and Rasinski (2000) outlined a model of the survey response processes, taking into account the cognitive tasks that survey respondents need to perform when answering items. First, respondents need to comprehend the item. As mentioned in the literature review, terms like 'social class' are not uniformly defined among scholars (Walpole, 2007; NCES, 2012), let alone students who presumably do not give very much thought to the concept in their day-to-day living. Secondly, information must be retrieved from long-term memory, and the cues in the item must trigger recall. When asked about their parents' annual household income before taxes, for the prior tax year, seniors may not know or recall this information, as it was undoubtedly secondhand information. They probably did not fill out their parents' tax forms, nor were they personally familiar with their parents pay schedule. While the results of the Phase I validity study suggested that students, on average, were pretty good at self-reporting, in the aggregate, parental household income and social class, that study was limited to only one institution for which financial aid records were available. Further research is needed to determine if these items function properly over time and with different survey samples.

Tourangeau, Rips, and Raskinski (1999) mentioned that when respondents judge their recall as incomplete, they rely on strategies to make them complete, such as averaging over prototypical time periods, such as weeks, months, and years, and this process does

not always lead to accurate reporting. Respondents also differ in the amount of effort they are willing to invest to correctly answer a survey item, especially when it comes to reporting income, which recalling can be more complicated than it appears. Like the findings in Phase I research, Moore, Stinson and Welniak, in their review of the Current Population Survey, found that when individuals answered questions about sources of income, they tended to underestimate income, as they did not add up all sources when reporting a total income for a tax year (as cited in Tourangeau, Rips, & Rasinski, 2000). Since the cognitive task presented, especially without SERU survey item response options of "I don't know" or "I prefer not to answer", forced students to make a choice of one of the eleven response options or skip the item. Tourangeau, Rips and Rasinski (2000) also highlighted literature that shows that when students are presented with ordered categories, they usually use the extreme endpoints as anchors, and distributions of responses tend to cluster around the midpoint. The descriptive results of both Phase I and Phase II of this study, using the parental household income and social class scales, both exhibited this midpoint clustering of responses, which may or may not be indicative of the true income population distribution.

The income scale's eleven categories of unequal width may have also created a cognitive challenge and respondents may have had a hard time accurately mapping their perceptions of income onto the scale, income questions are typically considered sensitive and prone to respondent non-response. Tourangeau, Rips and Rasinski (2000) argued that sensitive questions have unique aspects, including "social (un)desirability, invasion of

privacy, and risk of disclosure of answers to third parties" (p. 257). The social class item asks students to indicate whether they were low-income/poor, working class, middle class, upper-middle/professional or wealthy. Negative or positive connotations could be associated with different social class categories, as worded, perhaps resulting in responses that clustered around the middle class. Indeed, studies of social class have found that many Americans consider themselves middle class (Walpole, 2007). More research needs to be done to find out if words such as "poor" or "wealthy" are value-laden, loaded terms that would persuade respondents to answer in a socially (un)desirable way. The Current Population Survey has regularly asked households about their income, as well as a breakdown of income sources. According to Moore, Stinson, and Welniak, (1999), more than a quarter of income data is missing (as cited in Taranguea, Rips & Rasinski, 2000), leading researchers to conclude that these items are sensitive in nature. Unfortunately, this study did not explore patterns of missingness for the income and social class items, and it would be prudent to do so in subsequent studies.

Secondly, perhaps there is not a true relationship between seniors' parental household income and social class and HIPs participation or measures used. Phase II of the study was designed to fill a gap in the literature regarding the impact of financial circumstances, above and beyond traditional indicators such as race/ethnicity, sex, and first-generation student status. Due to the lack of HIPs equity literature that included financial circumstances, it is hard to directly compare the results of this study with others interested in knowing who participates in HIPs. We do know that only including a small

number of indicators of financial circumstances does not adequately capture the complexity involved in measuring socio-economic status. NCES (2012) convened a panel of experts to define, identify components, and review data collection and measurement techniques to better understand SES, as SES has been consistently linked with educational outcomes. The panel developed an SES definition, and it extended beyond the traditionally used facets of parental education, household income, and occupational prestige. They stated

> SES can be defined broadly as one's access to financial, social, cultural, and human capital resources….An expanded SES measure could include measures of additional household, neighborhood, and school resources (p. 4).

While this study found that, when using familial-based income and social class indicators, that financial circumstances did not impact HIPs participation, further research is needed that (1) includes a more robust set of SES indicators, and (2) expands the conceptualization of SES in a way that fits the population of college students. For the former, if a researcher uses SERU survey data, perhaps first-generation student status should be included as a representation of SES, rather than as part of a student's background characteristics. Indeed, parental education is typically used as an SES indicator (NCES, 2012).

For the latter, a re-conceptualization of SES is needed; one that recognizes the unique situation that traditionally-aged, financially dependent college seniors face when they are no longer directly subsumed in the SES that they were growing up. Indeed, Walpole (2007), in a review of the literature on college students and SES, noted the nuanced nature of how studies define social class and SES, stating "In defining social class and SES, many studies use relative definitions based on the sample, resulting in a range of definitions" (p. 3). Scholars have noted the difficulty of defining SES, especially as applied to college students (Soria, 2013; Barratt 2011). While there are agreed upon definitions in studies conducted by the National Center for Education Statistics (2012), they may not be applicable to college students. On the topic of defining SES, NCES (2012) noted

> The term "socioeconomic status" has been described as groups of people with similar occupational, educational, and economic characteristics; a person's relative standing in society based on income, power, background, and prestige; the social standing or class of an individual or group; the placement of persons, families, households, census tracts, or other aggregates with respect to the capacity to create or consume goods that are valued in our society; and the hierarchical rank of an individual or family in a particular community or society (p. 3).

Students in this sample may no longer be as ingrained in the SES they experienced while growing up, yet they may not have entered the post-collegiate process of carving their personal SES as a working adult.

Future studies should delve more fully into the definition of SES for the college student population, and what important aspects of SES should be operationalized in order to truly understand the impact that SES has on HIPs participation. Operationalizing social class for K-12 arena have been documented (Connelly, 2006; NCES, 2012; Harwell & LeBeau, 2010), and studies have consistently demonstrated a link between SES and K-12 educational attainment. One salient feature of the collegiate environment for the student population of interest in this dissertation is that they are immersed in the collegiate environment on assumedly a full-time basis, and, being that they entered as first-time freshmen, were probably required to reside in the residence hall for the freshman year, which offers the opportunity to develop a social network, one that may be very different from the social network experienced in the community from which they came. Additionally, all seniors in this dissertation had a declared major, which also offers entrance into a disciplinary field of study social network.

Coleman (1988) highlighted the importance of social capital when understanding SES. Coleman stated,

> Social capital is defined by its function. It is not a single entity but a variety of different entities, with two elements in common: they all consist of some aspect of

> social structures, and they facilitate certain actions of actors-whether persons or corporate actors-within the structure. Like other forms of capital, social capital is productive, making possible the achievement of certain ends that in its absence would not be possible. (p. 98).

Social capital "exists in the relations with people" (Coleman, 1988, p. 100). Social capital is exercised when, by mere interaction with a group of people possessing, individuals are automatically privy to that information and do not need to go to great lengths to find the information on their own.

College provides a structure in which social capital can easily be spread. Living and working in close proximity to peers in a similar age group and stage of life allows for the creation of networks within an environment that involves social capital sharing. The college environment, in effect, can act as what Coleman (1988) terms as a "closed network", which enables the development of norms amongst the network, in which certain behaviors are reinforced or punished by the community.

This dissertation focused on a select set of seniors, as previously mentioned. While not measured in this dissertation, it can be posited that these students lived in residence halls as freshman and made contacts in the university over their tenure to senior year, especially within the academic major. Perhaps students, through their breaking away from their primary social network of family, and corresponding family financial

circumstances and social class, may have contributed to them gaining social capital and no longer necessitated them to rely on family resources.

By being a member of a closed network possessing social capital, a low-income or working class student may be just as privy to resourceful information and belong to obligation networks as their traditionally more advantaged peers, and that social capital impacts their experience in school. Perhaps social capital can be used to explain why students, regardless of parental financial circumstances and social class while growing up, participate in HIPs at the statistically same rate as their more advantaged peers. Knowing about and having access HIPs, and norms and obligations that may reinforce participation in such activities, may be a power influence, one that works above and beyond parental financial circumstances and social class when growing up..

Coleman (1988) considered family as a social network, and a potential source of social capital, stating that many studies have found that financial background is related to educational achievement in K-12 settings. Family background, Coleman argued, can be separated into three types of capital: financial, human, and social. According to Coleman, the first two can ensure that students' physical and financial needs are attended to, as well as the cognitive needs that can potentially be nourished by the intellectual environment provided by the parents. Both financial and human capital can enhance academic achievement of K-12 students. Seniors, as represented by this study, are not as reliant on their parents' financial and human capital. They can receive grants and loans to cover the cost of attending college and are exposed to an intellectually stimulating environment by

being in college, which in turn, could impact students' level of motivation and ability to participate in HIPs.

When a student attends college, social capital that existed between the family, community and child prior to leaving home, *may* lose strength due to the loss of proximity. Keep in mind, this is a vast generalization, and some students do not break away from their family life and home communities, but rather negotiate living in both worlds. It is merely being offered as one possible explanation as to why parental financial circumstances did not impact HIPs participation. In summary, students may not only have access to different social, financial, and human capital by attending college, by being part of the college social network, they may internalized norms and behaviors that are favored in their new social environment.

Speaking specifically to social class of college students, Kaufman (2003) found that college students that he interviewed at a medium-sized Midwestern university with a large percentage of first-generation college students, that students went through a process of transforming from their "ascribed social class position" to an "achieved social class position" (p. 482) . Kauffman argued that if students decide that they want to be part of a different social class, such as from moving from low-income/poor and working class to middle class, they not only have to change their behavior and ways of thinking to more closely match their aspirational peers, they also must be accepted by their peers in the aspirational social class.

Seniors in this sample may engage in professional development experiences, like research with faculty, internships, and senior theses/capstones, as a way to mirror typical behavior that they perceive students from higher social classes as doing. Kaufman (2003) further posits that many students break away from former communities associated with lower social classes in their attempt to as assimilate, highlighting the dominance of the new peer group students are exposed to while in college.

Kaufman (2003) highlighted many instances of students choosing activities that they perceived as reflective of their aspired social class. Perhaps seniors in this sample engaged in professional development experiences, like research with faculty, internships, and senior theses/capstones, as a way to mirror typical behavior that they perceive as typical of their ascribed social class. Feldman, Smart & Ethington (1999) also highlighted the socializing forces of college students, especially within academic major. Students tend to engage in behavior and adopt the cultural norms and values of the field in which they are immersed. Seniors, nearing the end of their academic career, after having considerable exposure to collegiate peers, faculty and staff, may view participation in HIPs as a natural extension of their emergence into a higher social class and enhancing their professional identity.

In summary, college can serve as a socializing experience and contributes to social class identity transformation and alignment with peers and faculty within the collegiate

and disciplinary environment. Further, students financial, human, and social capital may be enhanced due to being in a closed system offered by the collegiate and disciplinary environment. A more refined measurement of SES that is specifically relevant to college students should be explored in future studies. One of the limitations of this dissertation is that the conceptualization of SES and measures used were typical of studies used in K-12 research studies, and these measurements may not be accurate indicators of college student SES.

Disciplinary field.

One of the most noteworthy findings were that students' disciplinary field of study had a large impact on HIPs participation, after controlling for student characteristics and financial circumstances. This finding is not surprising, considering the findings of past research on HIPs participation (Kuh, 2008; NSSE 2010, NSSE 2012; NSSE, 2013; Douglass & Zhao, 2013) and theoretical lenses that emphasize disciplinary fields' professional socializing impact on students through emphasizing the acculturation of disciplinary norms and valued activities (Feldman, Smart, & Ethington, 1999; Holland, 1997).

Astin (1993) considered students' initial choice of major as a bridge variable, as it not only represents student characteristics at matriculation, but also is a major component of the collegiate environment and subsequent development (p. 90). He mentioned that academic major affects the courses, professors, and the peers that students are exposed to,

all of which can impact outcomes. While Astin' theory was focused on collegiate outcomes, and not necessarily on what HIPs activities students engaged in throughout college, he noted that students majoring in the sciences were more likely to express an interest in research and pursue graduate studies in their chosen field. The findings of this research are aligned with Astin's theory, as students majoring in the sciences had higher odds of participating in faculty research relative to social science students. Perhaps the ethos and corresponding socializing activities within the science discipline encouraged majors to participate in faculty research, and in turn, they were more interested in pursuing research and graduate studies in scientific fields.

It must be noted that including disciplinary field of study in the model helped improve the prediction of HIPs participation, above and beyond traditional HIPs equity indicators and financial circumstances. This dissertation was primarily interested in discovering whether the inclusion of financial circumstances improved prediction of HIPs participation. Since a financial circumstance main effect was not detected, an interaction between financial circumstances and disciplinary field of study was not explored. Financial circumstances, as measured in this study, did not help us understand HIPs participation in this study, but academic discipline did.

Future HIPs equity studies should include academic discipline when studying HIPs participation equity. It may very well be the case that the influence of students' race/ethnicity, sex, and first-generation status on HIPs participation may depend on what

academic discipline they are exposed to in the college environment. Perhaps academic major would serve as a significant mediator or moderator variable between students' background characteristics and HIPs participation. In an attempt to address inconsistencies in the scholarly differentiation between mediating and moderating effects, Baron and Kenny (1986) delineated

> In general, a given variable may be said to function as a mediator to the extent that it accounts for the relation between the predictor and the criterion. Mediators explain how external physical events take on internal psychological significance. Whereas moderator variables specify when certain effects will hold, mediators speak to how or why such effects occur (p. 1176).

When testing a moderating effect, interactions are typically estimated (Baron & Kenny, 1986; Martinez, Sher, Krull, & Wood, 2009), such as through examining the potential impact of interactions between race/ethnicity and academic major, for instance, on explaining HIPs participation. If academic discipline was found to have a moderating effect in future studies, including academic major in the model would impact the relationship between student inputs and HIPs participation.

As an example, to test the potential mediating effects, one could use path analysis (Baron & Kenny, 1986), and estimate the direct effects between race/ethnicity and HIPs participation and academic major. After controlling for direct effects, if academic major

does not mediate the effects of student characteristics, like race/ethnicity, then the relationship between academic major and HIPs participation should be null.

It may very well be the case that the influence of students' race/ethnicity, sex, and first-generation status, and disciplinary field of study on HIPs participation may depend on what academic discipline they are exposed to in the college environment. Lydell & Gorny (2014), in their descriptive study of students who participate in HIPs, based on responses to SERU 2012 multi-institutional sample, compared the representation of students reporting in the lower SERU income brackets in disciplinary fields of study. We found that students from household incomes of less than $35,000 were underrepresented in Business and Engineering, and over-represented in the social sciences. While students in this income category made up 18% (n=4212) of all survey respondents, only 14.8% (n=225) of these students majored in Business, and 14.7% (n=444) majored in Engineering. On the flipside, 23% of students in this income category majored in social sciences. In future studies, it would be prudent to explore the potential role of parental financial circumstances plays on students' choice of major.

The results of this study showed that disciplinary field of study improved the prediction of research with faculty by 5%, and internships by 6%, after controlling for race/ethnicity, first-generation status, gender, and financial circumstances. This finding is significant, especially given the research on the role that academic major plays on enhancing intellectual and practical skills. While Pascarella and Terenzini (2016) did not

focus on who participates in HIPs in their extensive review of college impact literature, they did highlight the fact that many studies included the influence of college major when trying to understand outcomes in cognitive and affective development. They pointed out that studies focused on students specifically within major, thus controlling for the impact of major in the research design. They also cited literature that used major as a covariate and studies that sampled within majors as convenience samples.

As discussed in the literature review, major can have a significant impact on which types of HIPs that students participate in (Reihl & Weiner, 2013; Douglass & Zhao, 2013) and self-reported student learning outcomes (Thompson & Douglass, 2009). Pascarella and Terenzini's (2016) review of the literature also support this conclusion by citing studies that demonstrated impacts of the college major. Based on their literature review, they summarized, "intellectual and cognitive development are likely more a function of practices within each major or field than between majors and fields" (p. 121). In future HIPs equity studies, it would be prudent to step away from between major comparisons and focus on disciplinary context by modelling HIPs participation within disciplinary field of study, separately.

Limitations.

This dissertation focused on the impact of student background characteristics, financial circumstances, and disciplinary field of study, using statistical controls in regression modelling. Some scholars might argue that the approach employs a narrow-minded focus,

as students' identities are more complex (Crenshaw, 1991; Museus & Griffin, 2011; Soria, 2013). Interersectionality theory presents a framework for understanding the student experience. Applying Crenshaw's (1991) intersectionality reasoning, students' multiple identities, or the cross-section of identities, should be acknowledged. Some scholars have argued for changes in research methodologies (McCall, 2005; Museus & Griffin, 2011), and others have employed research techniques to take intersectionality into account when trying to understand the student experience (Soria, 2013) and educational attainment (Connolly, 2006). Connolly (2006) reexamined Youth Cohort Data using an intersectionality framework, and modelled interaction effects between sex and social class, and sex and race/ethnicity, on understanding their potential impact on educational attainment.

Museus & Griffin (2011) urged institutional researchers to move beyond the mere examination of the student experience by narrowly defined categories, such as race/ethnicity, and consider students' multiple identities. By doing so, they argued, institutional researchers would naturally ask a different set of questions, which may be more relevant and produce data that is mode indicative of the student experience. Finley (2011), acknowledged that while observing strong effects of HIPs participation for traditionally underserved students, she notes the problem of oversimplifying the student experience by narrowly using racial/ethnic categories. She stated that the findings from her study "assume students are a single, homogenous group…the reality, however, is that the heterogeneity of students across race and ethnicity and socioeconomic class creates

different opportunities, paths, and experiences of learning for these students on campuses (p. 5). Future HIPs participation equity studies should take into account intersectionality of student background characteristics.

This study narrowly focused on the foundational issue of access, and how participation in HIPs vary based on student background characteristics, financial circumstances, and academic major. While it is important that institutions of higher education take strides to ensure that students from traditionally underserved backgrounds have equitable access and work towards removing potential barriers to participation, it is imperative that we view HIPs through a wider lens. As Astin's (1993) theory would suggest, moving from knowing about who participates in HIPS, and into the study of the impact that HIPs participation has on collegiate outcomes, especially for traditionally underserved students, is important. After an extensive review of HIPs literature, Brownell and Swaner (2009) encouraged practitioners to build assessment into HIPs in

> Our understanding of outcomes would be enhanced by: (1) the use of more longitudinal approaches and comparison groups; (2) studies moving beyond student persistence to student learning; (3) a mixture of both qualitative and quantitative research methods; (4) clearer descriptions about program components; (5) more attention to outcomes for traditionally underserved student populations; and (6) more multi-institution studies, which could be attained through institutional collaboration and consortia. Each of these improvements

> would increase our effectiveness at designing quality initiatives for our students (p. 30).

More work needs to be done to ensure that HIPs are optimally positioned to help students achieve positive outcomes that are associated with a college education. Continuing studies should delve into what is it about HIPs that produce positive impacts, while not losing sight of the differential impact that participation may have on supporting traditionally underserved students.

References

Agresti, A. (2007). *An introduction to categorical data analysis*. Hoboken, NJ: John Wiley & Sons Inc.

Arum, R., & Roksa, J. (2014). *Aspiring adults adrift: Tentative transitions of college graduates*. Chicago, IL: University of Chicago Press.

Association of American Colleges and Universities (2002). *Greater expectations: A new vision for learning as a nation goes to college*. Washington, DC: Association of American Colleges and Universities. Retrieved from https://www.aacu.org/sites/default/files/files/publications/GreaterExpectations.pdf

Association of American Colleges and Universities (2004). *Taking responsibility for quality of the baccalaureate degree*. Washington, DC: Association of American Colleges and Universities.

Association of American Colleges and Universities (2005). *Liberal education outcomes: A preliminary report on achievement in college*. Washington, D.C.: Association of American Colleges and Universities.

Association of American Colleges and Universities (n.d.). An Introduction to LEAP. Retrieved from http://aacu.org/sites/default/files/files/LEAP/IntroToLEAP2015.pdf

Association of American Universities (n.d.). AAU Membership Policy. Retrieved from https://www.aau.edu/who-we-are

Association of American Universities (n.d.). Our Members. Retrieved from https://www.aau.edu/who-we-are

Association of American Universities (n.d.). By the Numbers. Retrieved from https://www.aau.edu/who-we-are/aau-numbers

Association of American Universities (n.d.). College Student. Retrieved from https://www.aau.edu/who-we-are

Astin, A. W. (1984). Student involvement: A developmental theory for higher education. *Journal of College Student Personnel*, *25*(4), 297-308.

Astin, A. (1993). *What matters in college: Four critical years revisited*. San Francisco: Jossey-Bass.

Astin, A. W. (1999). Student involvement: A developmental theory for higher education. *Journal of College Student Development*, *40*(5), 518-29.

Baron, R. M., & Kenny, D. A. (1986). The moderator-mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology*, *51*, 1173-1182.

Barratt, W. (2011). *Social class on campus: Theories and manifestations*. Sterling, VA: Stylus Publishing, Inc.

Bauer, K. W., & Bennett, J. S. (2003). Alumni perceptions used to assess undergraduate research experience. *The Journal of Higher Education*, *74*(2), 210–30.

Bensimon, E. M. (2004). The diversity scorecard: A learning approach to institutional change. *Change*, *36*(1), 45-52.

Bensimon, E.M. (2007). The underestimated significance of practitioner knowledge in the scholarship of student success." *Review of Higher Education, 30*(4), 441–469

Bok, D. (2006). *Our Underachieving Colleges*. Princeton, NJ: Princeton University Press.

Bowman, N. A., & Hill, P. L. (2011). Measuring how college affects students: Social desirability and other potential biases in college student self-reported gains. *New Directions for Institutional Research, 2011*(150), 73-85.

Bowman, N. A., & Herzog, S. (2011). Reconciling (seemingly) discrepant findings: Implications for practice and future research. *New Directions for Institutional Research, 2011*(150), 113-120.

Boyer Commission on Educating Undergraduates in the Research University, S. S. Kenny (chair). Reinventing Undergraduate Education: A Blueprint for America's Research Universities. State University of New York–Stony Brook, 1998.

Bransford, J.D., Brown, A.L., & Cocking, R.R. (1999). *How People Learn: Brain, Mind, Experience and School*. Washington, DC: National Academies Press.

Brooks, R., Benton-Kupper, J., & Slayton, D. (2004). Curricular aims: Assessment of a university capstone course. *The Journal of General Education*, *53*(3), 275-287.

Brownell, J. E., & Swaner, L. E. (2009). High-impact practices: Applying the learning outcomes literature to the development of successful campus programs. *Peer Review*, *11*(2), 26-30.

Brownell, J. E. & Swaner, L. E. (2010). *Five high-impact practices: Research on learning outcomes, completion, and quality.* Washington, DC: Association of American Colleges and Universities.

Cabrera, A. F., Nora, A., & Castañeda, M. B. (1992). The role of finances in the persistence process: A structural model. *Research in Higher Education*, *33*(5), 571-594.

Campbell, C. M., & Cabrera, A. F. (2011). How sound is NSSE?: Investigating the psychometric properties of NSSE at a public, research-extensive institution. *The Review of Higher Education*. *35*(1), 77-103.

Campbell, D. T., & Fiske, D. W. (1959). Convergent and discriminant validation by the multitrait-multimethod matrix. *Psychological bulletin*, *56*(2), 81.

Cahalan, M., Perna, L., Yamashita, M., Ruiz, R., & Franklin, K. (2016). Indicators of higher education equity in the United States: 2016 historical trend report, Washington, DC: Pell Institute for the Study of Opportunity in Higher Education.

Carey, S. J. 2010. Undergraduate research [Special issue]. *Peer Review*, 12(2).

Center for Urban Education (n.d.). Equity Scorecard. Retrieved from https://cue.usc.edu/tools/the-equity-scorecard/.

Center for the Study of Higher Education (n.d.). SERU Mission. Retrieved from http://www.cshe.berkeley.edu/seru/about-seru

Chatman, S. (2008). Measures of non-response bias associated with the 2008 administration of the University of California undergraduate experience survey. Berkeley, CA: University of California-Berkeley, Center for Studies in Higher Education.

Chatman, S. (2009). Factor Structure and Reliability of the 2008 and 2009 SERU/UCUES Questionnaire Core. SERU Project Technical Report. Berkeley, CA: University of California-Berkeley, Center for Studies in Higher Education.

Chatman, S. (2011). Factor structure and reliability of the 2011 SERU/UCUES questionnaire core. Berkeley, CA: University of California-Berkeley, Center for Studies in Higher Education.

Coleman, J. S. (1988). Social capital in the creation of human capital. *American Journal of Sociology*, *94* (Supplement), S95-S120.

Connolly, P. (2006). The effects of social class and ethnicity on sex, differences in GCSE attainment: A secondary analysis of the Youth Cohort Study of England and Wales, 1997-2001. *British Educational Research Journal*. *32*(1), 3-21.

Crenshaw, K. (1991). Mapping the margins: Intersectionality, identity politics, and violence against women of color. *Stanford Law Review*, *43*(6), 1241-1299.

Cross, K.P. (1999). Learning is about making connections. The cross papers, number 3, Phoenix, AZ: League for Innovation in the Community Colleges.

DesJardins, S. L., Ahlburg, D. A., & McCall, B. P. (2006). An integrated model of application, admission, enrollment, and financial aid. *Journal of Higher Education*, *77*(3), 381–429.

Douglass, J. A., & Zhao, C. M. (2013). Undergraduate research engagement at major US research universities. *Research & Occasional Paper Series*: Berkeley, CA: University of California-Berkeley, Center for Studies in Higher Education.

Dowd, A. C., & Sawatzky, M., & Korn, R. (2011). Theoretical foundations and a research agenda to validate measures of intercultural effort. *The Review of Higher Education, 35*(1), 17-44.

Eagan, M.K., Hurtado, S., Chang, M.J., Garcia, G.A., Herrera, F.A., & Garibay, J.C. (2013). Making a difference in science education: The impact of undergraduate research programs. *American Educational Research Journal*, *50*(4), 683–713.

Eisenmann, L. (2015). Making better colleges: AAC's century of change and commitment. *Liberal Education*, *101*(1/2), 30-37.

Epstein, C.D. (2007). A capstone teaching project for undergraduate nursing students: Development of a visual teaching-learning tool. *Educational Innovations*, *46*, 235–7.

Feldman, K. A., Smart, J. C., & Ethington, C. A. (1999). Major field and person-environment fit: Using Holland's theory to study change and stability of college students. *The Journal of Higher Education*, *70*(6), 642-669.

Ford, J. D., Bracken, J. L. and Wilson, G. D. 2009. The two-semester thesis model: Emphasizing research in undergraduate technical communication curricula. *Journal of Technical Writing and Communication*, *39*, 433–53.

Finley, A. (2011). Assessment of high-impact practices: Using finding to drive change in the compass project. *Peer Review*, *13*(2), 29-33.

Finley, A. & McNair, T. (2013). *Assessing underserved students' engagement in high-impact practices.* Washington, DC: Association of American Colleges and Universities.

Gardner, P. D., & Motschenbacher, G. (1997). Early work outcomes of co-op and non-co-op engineers: A comparison of expectations, job level, and salary. *Journal of Cooperative Education*, *33*, 6-24.

Gault, J., Leach, E., & Duey, M. (2010). Effects of business internships on job marketability: The employers' perspective. *Education & Training*, 52, 76-88.

Hart Research Associates (2006). *How should colleges prepare students to succeed in today's global economy?*. Washington, D.C.: Association of American Colleges and Universities. Retrieved from www.aacu.org/leap/documents/Re8097abcombined.pdf.

Hart Research Associates (2008). *How should colleges assess and improve student learning?*. Washington, D.C.: Association of American Colleges and Universities. Retrieved from www.aacu.org/leap/documents/2008_Business_Leader_Poll.pdf.

Hart Research Associates. (2013). *It takes more than a major: Employer priorities for college learning and success*. Washington, D.C.: Association of American Colleges and Universities. Retrieved from https://www.aacu.org/sites/default/files/files/LEAP/2013_EmployerSurvey.pdf

Hart Research Associates (2015). *Falling short? College learning and career success*. Washington, D.C.: Association of American Colleges and Universities. Retrieved from http://www.aacu.org/sites/default/files/files/LEAP/2015employerstudentsurvey.pdf

Harwell, M., & LeBeau, B. (2010). Student eligibility for a free lunch as an SES measure in education research. *Educational Researcher*, *39*(2), 120-131

Heller, D. E. (1997). Student price response in higher education: An update to Leslie and Brinkman. *The Journal of Higher Education*, *68*, 624-659.

Herzog, S. (2011). Gauging academic growth of bachelor degree recipients: Longitudinal vs. self-reported gains in general education. *New Directions for Institutional Research, 2011*(150), 21-39.

Herzog, S., & Bowman, N. A. (2011). Editors' notes. *New Directions for Institutional Research, 2011*(150), 1-6.

Higher Education Act of 1965, Part I—General Higher Education Programs, (as amended through P.L. 111-39, Enacted July 1, 2009.)

Holland, J. L. (1966). *The psychology of vocational choice*. Waltham, MA: Blaisdell.

Holland, J. L. (1973). *Making vocational choices*. Englewood Cliffs, NJ: Prentice-Hall.

Holland J. L. (1985). *Making vocational choices* (2nd ed.). Englewood Cliffs, NJ: Prentice-Hall.

Holland J. L. (1997). Making vocational choices: A theory of vocational personalities and work environments (3rd ed.). Odessa, FL: Psychological Assessment Resources

Hornak, A. M., Farrell. P. L., & Jackson, N. J. (2010). Making it (or not) on a dime in college: Implications for practice. *Journal of College Student Development, 51*(5), 481- 495.

Howard, G. S. (1980). Response-shift bias: A problem in evaluating interventions with pre/post self reports. *Evaluation Review*, *4*, 93-106.

Howard, G. S. & Dailey, P. R. (1979). Response-shift bias: A source of contamination of self-report measures. *Journal of Applied Psychology*, 64, 144-150.

Hu, S., & Kuh, G. D. (2002). Being (dis) engaged in educationally purposeful activities: The influences of student and institutional characteristics. *Research in Higher Education*, *43*(5), 555-575.

Hu, D. S. (2010). Scholarship awards, college choice, and student engagement in college activities: A study of high-achieving low-income students of color. *Journal of College Student Development*, *51*(2), 150-161.

Hurst, J.L., & Good, L.K. (2010). A 20-year evolution of internships: Implications for retail interns, employers and educators. *The International Review of Retail, Distribution and Consumer Research*, *20*, 175-186.

Jankowski, N. A., Ikenberry, S. O., Kinzie, J., Kuh, G. D., Shenoy, G. F., & Baker, G. R. (2012). Transparency & accountability: An evaluation of the VSA college portrait pilot. Urbana, IL: University of Illinois and Indiana University, National Institute for Learning Outcomes Assessment (NILOA).

Kardash, C. M. 2000. Evaluation of undergraduate research experience: Perceptions of undergraduate interns and their faculty mentors. *Journal of Educational Psychology*, *92*, 191–201.

Katkin, W. (2003). The Boyer Commission Report and Its Impact on Undergraduate Research. *New Directions for Teaching and Learning*, *2003*(93), 19-38.

Kaufman, P. (2003). Learning to not labor: How working-class individuals construct middle-class identities. *The Sociological Quarterly*, *44*, 481-504.

Keller, K.D. (2016). *Examining internships as high-impact practices.* Unpublished doctoral dissertation. Kansas State University, Kansas.

Kilgo, C. A. (2012). *The estimated effects of service learning and undergraduate research on students' intercultural effectiveness*. Unpublished doctoral dissertation. University of South Carolina, South Carolina.

Kilgo, C. A. (2016). *An epistemological revolution: using quantitative data to critically interrogate high-impact educational practices*. Unpublished doctoral dissertation. University of Iowa, Iowa.

Kilgo, C. A., Sheets, J. K. E., & Pascarella, E. T. (2015). The link between high-impact practices and student learning: Some longitudinal evidence. *Higher Education*, *69*(4), 509-525.

Kinzie, J. (2012). *High-impact practices: Promoting participation for all students.* Washington, DC: Association of American Colleges and Universities.

Knouse, S., Tanner, J., & Harris, E. (1999). The relation of college internships, college performance, and subsequent job opportunity. *Journal of Employment Counseling*, *36*, 35-43.

Kuh, G.D. (2003). The national survey of student engagement: Conceptual framework and overview of psychometric properties. Indiana University Center for Postsecondary Research and Planning, Bloomington, IN. Retrieved from http://nsse.indiana.edu/pdf/conceptual_framework_2003.pdf

Kuh, G. (2008). *High-impact educational practices: What they are, who has access to them, and why they matter.* Washington, DC: Association of American Colleges and Universities.

Kuh, G. D. (2009). The national survey of student engagement: Conceptual and empirical foundations. *New directions for institutional research*, *2009*(141), 5-20.

Kuh, G., Kinzie, J., Buckley, J.A., Bridges, B.K. & Hyek, J.C. (2007). Piecing together the student success puzzle: Research, propositions, and recommendations, *ASHE Higher Education Report, 32*(5), 1-182.

Kuh, G. D., Schuh, J. H., Whitt, E. J., & Associates. (1991). *Involving colleges: Successful approaches to fostering student learning and personal development outside the classroom*. San Francisco: Jossey-Bass

Laird, T.N., Shoup, R., Kuh, G. (2005, May). *Measuring Deep Approaches to Learning Using the National Study of Student Engagement*. Paper presented at Association of Institutional Research Forum Chicago, IL.

Leslie, L. L., & Brinkman, P. T. (1988). *The economic value of higher education*. New York: Macmillan.

Johnson, S. R. (2016). *The relationship between high-impact practices and timely bachelor's degree completion at four-year public institutions*. Unpublished doctoral dissertation. New York University, New York.

Lopatto, D. (2003). The essential features of undergraduate research. *Council on Undergraduate Research Quarterly, 23*(2) 139-142.

Lopatto, D. (2004). Survey of undergraduate research experiences (SURE): First findings. *Cell Biology Education*, *3*, 270–77.

Lopatto, D. (2006). Undergraduate research as a catalyst for liberal learning. *Peer Review, 8*(1) 22-25.

Lopatto, D. (2010). Undergraduate research as a high-impact practice. *Peer Review*, *12*(2), 27-30.

Lydell, L., & Gorny, L.S. (2014, October). *Who participates in high-impact practices? Profiles of student access and engagement across campuses*. Presentation for regional Association for Institutional Research of the Upper Midwest, Bloomington, MN.

Lydell, L., & Gorny, L.S. (2015a, May). *Beyond earnings: Mapping within-college experiences to post-graduation outcomes*. Presentation for Association for Institutional Research Forum conference, Denver, CO.

Lydell, L., & Gorny, L.S. (2015b, March). *Unpacking the equity toolkit: Access to high-impact practices for economically diverse students.* Presentation the Association of American Colleges and Universities' Annual Diversity, Learning, and Student Success conference, San Diego, CA.

Martinez, J. A., Sher, K. J., Krull, J. L., & Wood, P. K. (2009). Blue-collar scholars?: Mediators and moderators of university attrition in first-generation college students. *Journal of College Student Development*, *50*(1), 87–103.

Matos, V., and Grasser, R. (2007). Using reengineering as an integrating capstone experience. *Journal of Information Systems Education*, *18,* 85–101.

McGoldrick, K. M. (2008). Writing requirements and economic research opportunities in the undergraduate curriculum: Results from a survey of departmental practices. *Journal of Economic Education*, *39*, 287–296.

Messick, S. (1995). Validity of psychological assessment: Validation of inferences from persons' responses and performances as scientific inquiry into score meaning. *American Psychologist, 50*(9), 741-749.

Mantsios, G. (2004). Class in America: Myths and realities—2003. In P. S. Rothenberg (Ed.), *Race, class, and sex in the United States: An integrated study* (6th ed., pp. 193-207). New York, NY: Worth.

Moore, J. C., Stinson, L. L., & Welniak, E. (1999). Income reporting in surveys: Cognitive issues and measurement error. *Cognition and Survey Research*, 155-174.

Museus, S. D., & Griffin, K. A. (2011). Mapping the margins in higher education: On the promise of intersectionality frameworks in research and discourse. *New Directions for Institutional Research*, *2011*(151), 5-13.

Narasimhan, R. (2009). Incorporating current research, wikis, and discussion lists in a mathematics capstone course. *Primus, 19*, 29–38.

National Association of Colleges and Employers (2010). *U.S. Internships: A Definition and Criteria to Assess Opportunities And Determine the Implications for Compensation*. Retrieved from the NACE website http://www.naceweb.org/advocacy/position-statements/united-states-internships.aspx.

National Assessment Governing Board (2003). *Background information framework for the National Assessment of Educational Progress*. Washington, DC: U.S. Department of Education, National Assessment Governing Board.

National Center for Education Statistics, U.S. Department of Education (2011). *Trends in attainment among student populations at increased risk of noncompletion: Selected years, 1989–90 to 2008–09*. Retrieved from the NCES website http://nces.ed.gov/pubsearch/pubsinfo.asp?pubid=2012254 Publication #: NCES 2012254.

National Center for Education Statistics, U.S. Department of Education (2012). *Improving the Measurement of Socioeconomic Status for the National Assessment of Educational Progress: A Theoretical Foundation*. Retrieved from https://nces.ed.gov/nationsreportcard/pdf/researchcenter/socioeconomic_factors.pdf

National Survey of Student Engagement (2010). *Major differences: Examining student engagement by field of study: Annual results 2010*. Bloomington, IN: Indiana University Center for Postsecondary Research.

National Study of Student Engagement (2012). *Annual results: Promoting student*

learning and institutional improvement. Bloomington, IN: Indiana University Center for Postsecondary Research.

National Study of Student Engagement (2013). *Annual results: A fresh look on student engagement*. Bloomington, IN: Indiana University Center for Postsecondary Research.

National Survey of Student Engagement (2016). Overview. Retrieved form http://nsse.indiana.edu/2016_Institutional_Report/pdf/NSSE_Overview_2016.pdf

National Survey of Student Engagement (n.d.). Common Data Recodes. Retrieved from http://nsse.indiana.edu/html/common_data_recodes.cfm

Oh, D. M., Kim, J. M., García, R. E. & Krilowicz, B. L. (2005). Valid and reliable authentic assessment of culminating student performance in the biomedical sciences. *Advances in Physiology Education, 29*, 83–93.

Olivas, M. A. (2011). If you build it, they will assess It (or, an open letter to George Kuh, with love and respect). *The Review of Higher Education, 35*(1), 1-15.

O'Neill, N. (2010). Internship as a high-impact practice: Some reflections on quality. *Peer Review*, *12*(4). 1-6.

Ostheimer, M. W. & White, E. M. (2005). Portfolio assessment in an American engineering college. *Assessing Writing*, *10*, 61–73.

Pace, C. R. (1980). Measuring the quality of student effort. *Current Issues in Higher Education*, 2, 10–16.

Pace, C. R. (1984). *Measuring the Quality of College Student Experiences: An Account of the Development and Use of the College Student Experiences Questionnaire*. Los Angeles: Higher Education Research Institute.

Pace, C. R. (1985). *The Credibility of Student Self-Reports*. Los Angeles: Center for the Study of Evaluation, University of California.

Pace, C. R. (1990). *The Undergraduates: A Report of Their Activities and College Experiences in the 1980s*. Los Angeles: Center for the Study of Evaluation, UCLA Graduate School of Education.

Padgett, R. D., Johnson, M. P., & Pascarella, E. T. (2012). First-generation undergraduate students and the impacts of the first year of college: Additional evidence. *Journal of College Student Development*, *53*(2), 243-266

Parker, E.T., Kilgo, C.A., Sheets, J.K. & Pascarella, E.T. (2016). The differential effects of internship participation on end-of-fourth-year GPA by demographic and institutional characteristics. *Journal of College Student Development*, *57*(1), 104-109.

Pascarella, E. T., & Terenzini, P. T. (1991). *How college affects students: Findings and insights from twenty years of research*. San Francisco, CA: Jossey-Bass.

Pascarella, E. T., and Terenzini, P. T. (2005). *How college affects students: A third decade of research* (Vol. 2). San Francisco: Jossey-Bass.

Pascarella, E. T., and Terenzini, P. T. (2016). *How college affects students: 21st century evidence that higher education works* (Vol. 3). San Francisco: Jossey-Bass.

Pedhazur, E. J., & Schmelkin, L. P. (1991). *Measurement, design, and analysis: An integrated approach*. Hillside, NJ: Erlbaum.

Perez, L. M. (2016). *Turning the ship towards this new shiny object: Exploring the institutional approach to implementation of high impact practice initiatives.* Unpublished doctoral dissertation. California State University, Fullerton.

Perna, L. W. (2005). The benefits of higher education: Sex, racial/ethnic, and socioeconomic group differences. *Review of Higher Education, 29*(1), 23–52.

Porter, S. R.(2011). Do college student surveys have any validity?. *The Review of Higher Education, 35*(1), 45-76.

Porter, S. R., Rumann, C., & Pontius, J. (2011). The validity of student engagement survey questions: Can we accurately measure academic challenge? *New Directions for Institutional Research, 2011*(150), 87-98.

Quaye, S. J., & Harper, S. R. (Eds.). (2009). *Student engagement in higher education: Theoretical perspectives and practical approaches for diverse populations*. New York, NY: Routledge.

Riehle, C.F., & Weiner, S.A. (2011). High-Impact educational practices: An exploration of the role of information literacy. *College and Undergraduate Libraries, 20*(2), 127-143.

Roscoe, L. J., & Strapp, C. M. (2009). Increasing psychology students' satisfaction with preparedness through a professional issues course. *Teaching of Psychology, 36,* 18–23.

Schneider, C.G. (2008). *About liberal education and America's Promise (LEAP): Excellence for everyone as a nation goes to college*. In Kuh's (2008) High-impact Practices: What are they, who has access to them and why do they matter?" Washington, D.C.: Association of American Colleges and Universities.

Schneider, C.G. & Albertine, S. (2013). *A new inquiry into high-impact practices*. In Finley & McNair's (2013), Assessing Underserved Students' Engagement in High-impact practices. Washington, D.C.: Association of American Colleges and Universities.

Seymour, E., Hunter, A-B., Laursen, S. L. and DeAntoni, T. 2004. Establishing the benefits of research experiences for undergraduates in the sciences: First findings from a three-year study. *Science Education, 88*, 493–534.

Seifert, T. A., & Asel, A. M. (2011). The tie that binds: The role of self-reported high school gains in self-reported college gains. *New Directions for Institutional Research, 2011*(150), 59-72.

Sharp, M. D., Komives, S. R., & Fincher, J. (2011). Learning outcomes in academic disciplines: Identifying common ground. *Journal of Student Affairs Research and Practice*, *48*(4), 481–504.

Smart, J. C., Feldman, K. A., & Ethington, C. A. (2000). *Academic disciplines: Holland's theory and the study of college students and faculty*. Nashville, TN: Vanderbilt University Press.

Soria, K.M., (2013) *What happens outside of the classroom(ed)room? Examining college students' social class and social integration in higher education*. Doctoral dissertation, University of Minnesota.

Spellings, M., United States., & United States. (2006). *A test of leadership: Charting the future of U.S. higher education*. Washington, D.C.: U.S. Dept. of Education.

St. John, E. P. (2003). *Refinancing the college dream: Access, equal opportunity, and justice for taxpayers*. Baltimore, MD: The Johns Hopkins University Press.

St. John, E. P., Asker, E., & Hu, S. (2001). The role of finances in student choice: A review of theory and research. In M. B. Paulsen & J. C. Smart (Eds.), *The finance of higher education: Theory, research, policy, and practice* (pp. 419-438). New York: Agathon.

Federal Student Aid (n.d.). Information for Financial Aid Professionals: Student Aid Formula. Retrieved form https://studentaid.ed.gov/sa/sites/default/files/2016-17-efc-formula.pdf.

Sudman, S., & Bradburn, N. M. (1974). *Response effects in surveys.* Chicago, IL: Aldine.

Terenzini, P. T., Springer, L., Yaeger, P. M., Pascarella, E. T., & Nora, A. (1996). First-generation college students: Characteristics, experiences, and cognitive development. *Research in Higher Education, 37*(1), 1-22.

Thomson, G., & Douglass, J. A. (2009). *Decoding learning gains: Measuring outcomes and the pivotal role of the major and student backgrounds*. Berkeley, CA: University of California-Berkeley, Center for Studies in Higher Education.

Tinto, V. (1987). *Leaving College: Rethinking the Causes and Cures of Student Attrition*. Chicago, IL: University of Chicago Press.

Tinto, V. (1993). *Leaving College: Rethinking the Causes and Cures of Student Attrition*. (2nd ed.) Chicago, IL: University of Chicago Press.

Tourangeau, R., Rips, L. J., & Rasinski, K. (2000). *The psychology of survey response*. Cambridge University Press.

Walpole, M. (2007). Economically and educationally challenged students in higher education: Access to outcomes. *ASHE Higher Education Report*, 33(3).

Zhao, H., & Liden, R. C. (2010). Internship: A recruitment and selection perspective. *Journal of Applied Psychology, 96*, 221-229.